Plea of the Ultimate Consumer

I am the Ultimate Consumer.

I am one hundred million strong.

I buy by the billions plus. My power is limitless, my resources inexhaustible.

I control the volume of business in these United States.

I can produce inflation or depression, good times or hard times.

I am conscious of the power I possess and realize that I must ever use it aright, and only for the benefit of all.

I determine market prices.

I pay all labor, production costs, merchandising processes, and profits.

I am the agricultural, commercial and industrial Court of Last Resort. What and when I will, I buy. Consumption is my function.

Now, you executive of both labor and manufacture, listen to me for I, the Ultimate Consumer of your energy and goods, have somewhat to say to you. I need your labor and your commodities daily, weekly, monthly, every year. I am willing, yes, I propose to place my orders for all my needs so far ahead of my requirements of them as will enable you to keep working and running to capacity volume, in order to give me the benefit of your lowest overhead cost, and largest dependable service.

I want your labor to be steadily employed at justly compensatory pay, and your machinery to be kept at its maximum mark of production consistent with ample profit.

I need your labor and commodities and am paying you handsomely for them, but don't forget that you need my continuing good-will consumption. Without it, it were useless for you to produce.

Now, I am the Ultimate Consumer. I alone make the markets active or slow. You have seen recently a "lull" come over the commercial activities. That is merely the expression of my disapproval of your attempt to jack up wages and commodity prices above the January, 1923, level.

I am the Ultimate Consumer. I will not buy your goods on any advancing prices over the January last basis.

Living costs are up a bare 60% over the July, 1914, basis, while wages and earnings are up over 100% above the July, 1914, basis. It's enough. I came into the markets and bought freely for the first three months of this year. Then some of you began to arbitrarily raise your wages and the executives of manufacture charged these advances into their commodity prices and passed them on for me to pay. But I will not. So, from April 1st, I have curtailed the volume of buying which I alone control, and hence the "lull" in business.

I am the Ultimate Consumer. Don't forget nor neglect to reckon on my rights and powers. You are wise when you cultivate my favor for you will then cause me to release large volumes of orders, and you will prosper. But when you forget me and attempt to hoodwink me into paying unwarranted, arbitrary and forced advances, you will suffer.

I am the Ultimate Consumer. I know all the devious ways by which I have been sandbagged and compelled to pay outrageous prices for my needs, but those days and conditions are passed. I hate fluctuations. I've had too many. I propose from now on to use my power to produce a balanced condition between all classes of industry and stable, equitable prices for all.

I am the Ultimate Consumer. I need you and you need me. Recognize this great cardinal fact. Reform your tactics and methods; get back to the January, 1923, basis. Keep your wages and prices stable and I will reward you with a volume of business, steady and regular, that shall insure a continuance of prosperity for all.

I am the Ultimate Consumer. I know whereof I speak, and I speak the words of fact and truth. Let us be honest with each other, not because honesty is the best policy, but because it is the only policy that will bring us permanent prosperity.

I am the Ultimate Consumer!

The right fan for the right place

The Right Fans for These Services—

Ask the Clarage Engineering Department for descriptions of Clarage-Kalamazoo Fans in these services:

Heating and Ventilating

In heating systems, in ventilating systems, or in combination heating and ventilating systems with or without humidifying systems, Clarage-Kalamazoo Fans are helping mill workers attain greater daily production by supplying them with clean fresh air at the right temperature.

Pneumatic Conveying

Raw stock is conveyed from one department to another through pipes by moving air supplied by Clarage-Kalamazoo Exhausters and Blowers; handling costs are greatly reduced.

Dust Removal

Clarage-Kalamazoo Exhausters are making mill atmosphere more healthful by withdrawing dust and by exhausting poisonous or obnoxious odors or gases.

Vapor Removal

In the machine room water vapor condenses on the machines or on the roof, from where it drips down onto the paper in manufacture. Clarage-Kalamazoo Fan Drying Systems prevent this condensation.

Mechanical Draft

A Clarage-Kalamazoo Fan direct connected to a Clarage-Kalamazoo Type V Vertical Engine is the unfailing combination for economical mechanical draft for the boiler room.

JUST what does it cost you to remove materials in your plant? Bring it down to the rock bottom basis of figures. Consider truck maintenance and operation, help required and power consumed.

The high power of moving air, controlled by the right fan will transport many of your light materials saving you many dollars.

And there are many other places where, by the installation of the right fan, moving air can be controlled and made to serve and save. It will collect dust and purify the air of shop and office alike, reducing the ever imminent fire hazard and improving working conditions. It will draw off waste heat turning it to drying and heating purposes and boost the capacity and efficiency of the boilers in the power house.

You can increase production and reduce costs—if you choose sturdy, enduring Clarage-Kalamazoo Fans and Blowers—and secure the economy that comes with long service. Let a Clarage harness moving air for profit in your plant.

Our engineers will tell you how.

Clarage Fan Co., Kalamazoo, Mich.

Complete Fan Stocks Carried in New York, Pittsburg and Special Stocks in Memphis

New York City	Cleveland	Detroit
Los Angeles	Chicago	Boston
Philadelphia	Pittsburgh	St. Louis
Memphis	Minneapolis	Rochester, N. Y.
Indianapolis		

CLARAGE
KALAMAZOO
Fans—Blowers—Engines

EDITORIALS

Convincing the Skeptic

DURING the latter part of May and the early part of this month there have been at least four notable conventions of paper men held in this country, namely, the National Association of the Pulp and Paper Mill Superintendents, the National Association of the Cost Men of the Paper Industry, the Northwestern Division of Superintendents and the Northeastern Division of Superintendents—every one a notable event.

We once heard a man remark that some people spent so much time going to conventions to learn how to do their work better that they never had time to do any work. We wish that this man could have attended with us that splendid meeting held up in Wisconsin by the superintendents of the Northwestern Division. He would have seen a serious minded group of superintendents, not in sessions of a formal convention, but actually working at the solution of problems which they had to meet and overcome in their own several plants and finding the solution more easily in the company of fellow workers than in the solitude of their own places of business.

We wish that our skeptical friend could have attended with us the meeting of cost men down in Cleveland. The cost men don't get together very often and when they do they are as eager to learn as a third hand is to sleep. Surely he couldn't say that the cost men **waste** any time on conventions.

And as a final blow to such a narrow view we wish —from the bottom of our heart we wish, that he could have attended with us that wonderful meeting in New England where were gathered pulp and paper mill superintendents from all over the country. We would have enjoyed sitting by him during the presentation of the somewhat weighty discussions relating to problems of the paper industry. We are sure that he would have been impressed. But no regular fellow, even if he is a skeptic, could resist the spirit of good fellowship which broke loose at the close of every "work session."

Blind Man's Bluff

A speaker before a small group of paper mill men, not very long ago, said that Germany's inability to supply another named country with a certain commodity was forcing this other country to buy whereever she could, "And about the only place they can buy," the speaker continued, "is from our company, so we are charging them a fancy price because they've got to have our stuff." The attitude of the speaker regarding this matter has been on our mind ever since.

Just this morning a bulletin from the Department of Commerce comes to our attention. The burden of this bulletin seems to be directed point blank at the above remarks. So coincidental is it that we give it in part as follows:

"An old abuse, so costly in the past to American prestige abroad, is again creeping into our export trade. Under the allurements of domestic boom conditions many of our manufacturers are showing increasing apathy to the legitimate requests and orders of foreign contacts whose patronage they so carefully solicited during the past few years. The sound policy of definite allotments for export is being ignored in far too many cases. Unless this disloyalty to firmly established foreign contacts is promptly overcome, American commercial prestige and good will abroad is likely to suffer serious damage.

"A group of strong British firms—the representatives of a number of prominent American manufacturing exporters—have just advised the American commercial attache in London that they are 'through for all time with the unreliability of American business executives—thoroughly sick and tired of the foreign-trade flirtations of their American connections whose export interest shifts with every vibration of domestic demands.'"

A policy of the above nature neither does credit to American business men as Americans nor as business men. It is both un-American and un-businesslike. The good will of this country, which as timber has been cultivated for years, is being ruthlessly chopped down and sold for a few dollars. It is like selling the house in which a man lives that he might have more money with which to enjoy home life. We will not call it a short-sighted policy—it is blind man's bluff.

America—nor any other country, for that matter—is sufficient unto itself. International commerce is absolutely essential to the prosperity of our country.

Every exporter in this country, who is governed in any degree by American ideals and a sensible view of the future, will court, instead of flirt, with oversea markets.

A Growing Problem

In view of the much-talked-of depletion of our pulp sources, the Woodlands Section of the American Paper and Pulp Association advocates a policy of building, or we might better say, a policy of growing for the future. This policy is briefly presented under the following five points:

1—A comprehensive survey of our domestic supplies of the paper industry's basic raw material—pulpwood.

2—A careful study of the probable costs and yields from artificial reforestation.

3—Forest education—for the public, the owner and the operator.

4—The development of practical plans for forest management to insure continuous production.

5—Sound Federal and State forest legislation.

A lengthy and withal informative discourse might well be written upon any one of these five points. The urgent necessity of growing for the future of the industry, however, seems to be so well established as a fact that the importance of these five points must be obvious to the industry at large.

Considered as a unit, the above five points present a thoroughly logical and constructive plan which when put into earnest practice will do much to insure an ample and safe supply of raw material for the future. We feel that the Woodlands Section deserves the hearty support of the entire industry in the furtherance of the above outlined policy.

We are with them.

What part of this sheet of paper is power cost ?

A CERTAIN fraction of the cost of manufacturing this paper is power cost—a surprisingly large part.

Did the manufacturer KNOW how much power was required to make it? If not, why not?

He knew how much pulp, how much clay, how much chemicals and other material was used.

He would not attempt to determine prices unless he knew—knew accurately. Then why should he not know how much steam was used—how much coal and water and boiler room labor?

Paper mills are beginning to realize that coal is a raw material. So they are paying greater attention to power plant cost accounting—a concrete science that has been developed by Republic engineers working with paper mill consulting engineers and cost accountants. The method is fully outlined in "Power Plant Cost Accounting," a standard filing size bulletin. Mail the coupon for your copy.

Republic Flow Meters Company, 2220 Diversey Parkway, CHICAGO

ONLY ELECTRICALLY OPERATED
REPUBLIC
FLOW METERS

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Please send immediately a copy of "Power Plant Cost Accounting."

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P Ind-6-23

Production, Men and Records

By H. M. GRASSELT

PRODUCTION, masterly directed and supervised, a proficient, accurate and loyal organization and carefully analyzed records may all be called the foundation of industrial success. These basic units must be co-ordinated to perfection, as the individual unit alone cannot function or even exist within an enterprise. Production is impossible without equipment and men, and the latter must have recourse to written records to achieve efficiency and continuous success.

Production

Maximum production at lowest cost depends on the adequacy of machinery and equipment, operated by a skilled working force, which is ably directed, and a timely and accurate knowledge of all the factors that pertain to production efficiency. Consequently, buildings and equipment must be so arranged as to facilitate a continuous flow of operations without extensive intrafactory transportation and resultant waste of time and material. The more closely machines and factory transportation can be co-ordinated, the greater the efficiency and results.

Maximum utilization of machinery and equipment prerequisites keeping them in perfect condition. Repairs require, therefore, prompt attention and thorough expert execution. Repair work, done by highly skilled men, should be scheduled ahead whenever possible. Preparatory work thus may be done very effectively in advance and the repairs themselves carried out with the least loss of time.

A machine inspection system, educating of operatives to properly handle their machine and at once report any irregularities they may observe, will add very much to the prevention of expensive shut-downs of machinery and possible attendant slowing of one or several departments.

Keeping of sufficient repair parts and standard spare parts for machines and equipment on hand is as important a factor to continuous efficient operations as a permanent stock of raw materials and supplies. Many a precious hour is wasted because of lack of spare parts in a case of emergency. Any such retardation in the process of manufacture will ultimately be reflected in the profit of the mill.

To attain highest production demands close observance of a due precaution against avoidable deterioration of buildings and equipment—they must be kept in perfect operating condition.

Men

Systematized operations and definitely fixed responsibility will insure effective results. To build up morale and friendly relations between workers and management requires an efficient and loyal organization. To take good care of employees is indeed a well-paying proposition, to protect their health and provide all possible protection against accidents is a duty. The introduction of welfare measures according to the company's resources and importance will create a better mutual understanding between employer and employees. It is an incitement to loyalty and co-operation and thus conducive to greater results. Executives who have gained the confidence of their men will have an efficient and loyal organization and doubtless obtain far better results than the man who is feared and disliked.

Standard rates of wages are fixed between trade unions and employers and rather uniform throughout the country. Regarding whether hourly rates, piece-work rates, etc., represent a just wage system, it may be said that the ideal fundamental principles upon which these questions rest is, to give fair, adequate remuneration and a square deal for an honest day's work. Especially the "square deal" must be mutual to make it effective.

Records

Records should contain facts based upon actual conditions in the mill. Modern business has no place for the man who guesses and since it is impossible for the individual to carry in mind all details and facts upon which transactions and operations are based, records that show all necessary information in an adequate and precise arrangement must be kept.

Business records may be divided into financial and statistical. The man in the mill is primarily interested in and responsible for the latter form. Practical men, whose aim is the achievement of best possible results as far as production is concerned, realize more and more that records are not "red tape" or a nuisance, but one of the most essential tools of modern industry and progress.

Records that have a direct bearing on plants and plant activities are essentially those covering controlling costs, keeping up production, stores and material control, maintaining the efficiency of equipment and labor, following up orders and shipments. To be effective, these records must be developed within the organization or at least adapted to the needs and peculiarities of the individual plant. To buy a certain "system" in the open market and expect that it will at once increase and improve the general efficiency in a plant is a fallacy.

Carefully kept records cut costs, facilitate operations and enable the elimination of waste. They also inspire confidence in the proficiency and soundness of an organization or enterprise.

Cost records, for instance, are more than mere tabulations of charges for materials, labor and in-

direct expenses. If accurate—and there should be no "if" with records—they will point out which lines may be profitably manufactured and therefore should be featured. They will disclose waste and indicate where investigation with a view of eliminating such should be started.

The cost of a product and its quality determine the success with which the manufacturer will find a ready market for it. Hence, cost and production records are valuable only to the extent to which they are correct and based on facts and not on guesses.

To keep step with changing conditions records should be analyzed frequently so that any errors or incorrect information may be eliminated and dependable control of all factors rendered certain.

Planning requires adequate records, so that the line-up of work and dispatch of the finished product can be made to meet promises. With reliable records available, promises made to customers can be kept and all work will move smoothly. Good shipping service and compliance with the customer's requests are of vital importance to the prosperity of a mill.

Material and stores' records are as essential as the cash book is in the office, for those liquid assets represent money and their value should not be carelessly regarded. Without systematic material control, much is spoiled or damaged in the various phases of the manufacturing process. It is human nature for the help to handle materials and supplies in a less careful way when they know that there is no way of checking them up. The knowledge of a rigid control will prompt them to more highly regard the value of materials and avoid wastages.

Furthermore, material records prevent overstocking and useless tying up of funds as well as shortages. They also insure against willful waste and pilfering.

The management pays the wages and therefore wants to know exactly how the employees spend their time. Carefully kept records on time and jobs are therefore essential. Time clocks with individual cards, which have to be checked against time distribution sheets made out by department foremen are the only effective safeguards against tardiness, errors and loss of time.

Boiler house logs, production books, power plant records, fire inspection records and records of accidents are of equal importance and direct value to superintendents and foremen. These executives must explain to their men the purpose of the various records they come in contact with and have to make out, so that they will take greater interest in them and render accurate figures and information.

There is no mystery about records, they should be simple and well-suited for their purpose and measure up in every case to the demands of utility.

The systematic collecting and preserving of manufacturing formulae and samples is another factor that permits of no neglect and must be given constant consideration.

The superintendent of a certain fine paper mill, with whom the writer is acquainted, has a very efficacious system of filing production samples. In his mill, the samples are cut to standard size, folded to a convenient size to fit into the filing cabinet compartment. The first copy of the production order,* on which the respective run was made and which contains on its first side a summary of all materials used in its manufacture, that is, a complete formula of the furnish, is fastened to the sample. The reverse side of the production order, adequately ruled, contains a tabulation of all components that went into the paper and finally the factory cost price per pound of paper. The samples are then filed according to the production numbers into compartments with fifty consecutive numbers each. An index, giving production order number, grade of paper and date made is kept by the superintendent and enables him to at once locate any required production samples whenever the occasion arises. This method saves him very much time and places within easy reach samples and formulae which he requires in the execution of his duties.

*The Paper Industry, October, 1922, "Serving the Customer," Fig. 2.

The Fourdrinier Machine

By HARRY E. WESTON

Instructor in Pulp and Paper Manufacture, The New York State College of Forestry, Syracuse, N. Y.

This is the seventh instalment of the article on the Fourdrinier machine in preparation by the author. Further installments will appear in succeeding issues.

The General Electric System

THE General Electric sectionalized paper machine drive consists of a direct current motor coupled directly to each of the various sections of the machine and so tied-in in relation to one another that the same relative speed between sections is maintained. Such an arrangement is necessary because each of the various sections of the paper machine operate at slightly different speeds. To keep these direct current motors in step with one another and to take up the changes in load, a synchronous motor of approximately 20% capacity of the main driving motor is mounted on the base of each of the

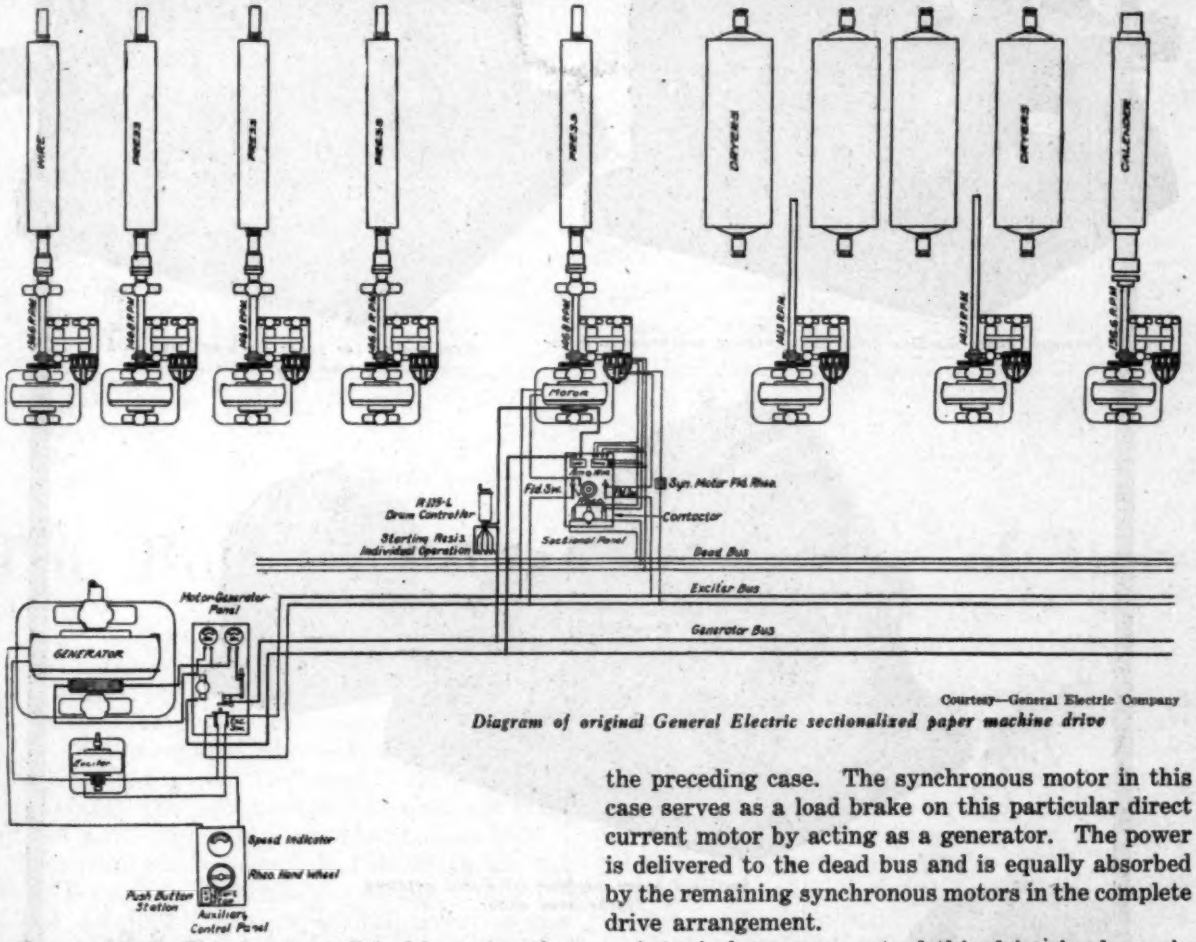
direct current motors and connected to the motor by means of a gear arrangement and pair of cones belted together.

In the ordinary operations of a machine it becomes necessary to increase or decrease the load on some particular section as conditions in stock vary. This change in load is absorbed by the synchronous motor of the particular section and is distributed over the entire machine. This is accomplished by connecting all synchronous motors to a dead bus. Such an arrangement prevents the change in load on the section from varying the speed of the direct current motor coupled to it.

The proper draw between sections is maintained by adjusting the belts on the cone pulleys of the section motors. If the speed of a particular section needs to be increased it is simply necessary to turn the hand-wheel of the motor, which operates the belt shifter, in the proper direction, until the desired speed is obtained.

The shifting of the belt in this case tends to decrease the speed of the synchronous motor, but, since its speed cannot be altered, assumes a portion of the load and draws power from the dead bus. Each of the other synchronous motors function as generators to supply the power, and the load on the direct current motor of the section is relieved and the latter motor increases its speed accordingly. By a slight weakening of the field of the main driving motor a condition is established which transfers the load from the synchronous motor to the main driving motor without changing its speed.

The speed of any section can be decreased by operating the belt shifter in the opposite direction from the preceding case. The synchronous motor in this case serves as a load brake on this particular direct current motor by acting as a generator. The power is delivered to the dead bus and is equally absorbed by the remaining synchronous motors in the complete drive arrangement.



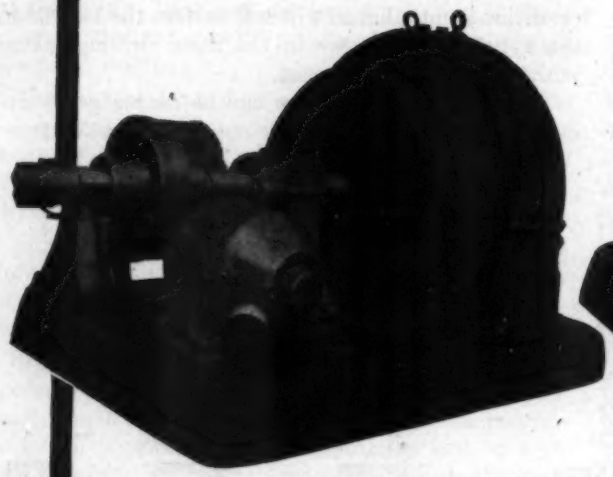
Courtesy—General Electric Company

Diagram of original General Electric sectionalized paper machine drive

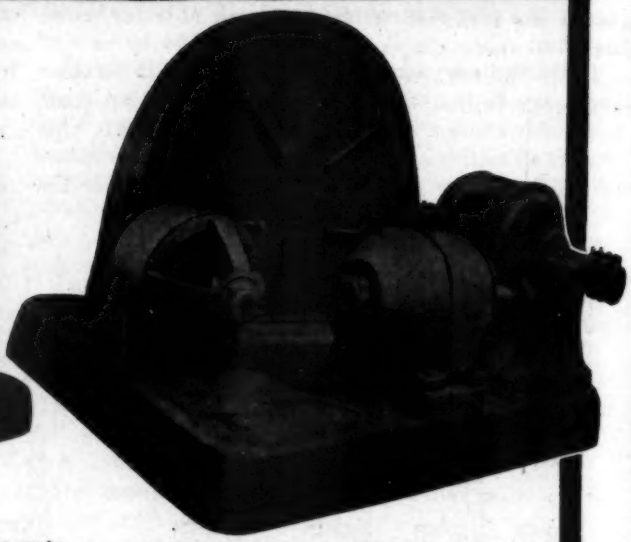
A typical arrangement of this drive is shown in the above diagram.

The original sectional drive has been modified with the idea of simplifying the equipment from a manufacturing and operating standpoint. This modification uses the same characteristic synchronous motor tie-in and is somewhat similar to the original except that in place of the gears, cones and belts for adjusting the draw of the sheet of paper are governors or synchronous motors built with revolving frames. The frames in turn are driven by small adjustable speed direct current motors. The purpose of making this modification was to eliminate the use of cones and belts and to have a drive that would enable the operator to handle the stretch and draw electrically rather than mechanically.

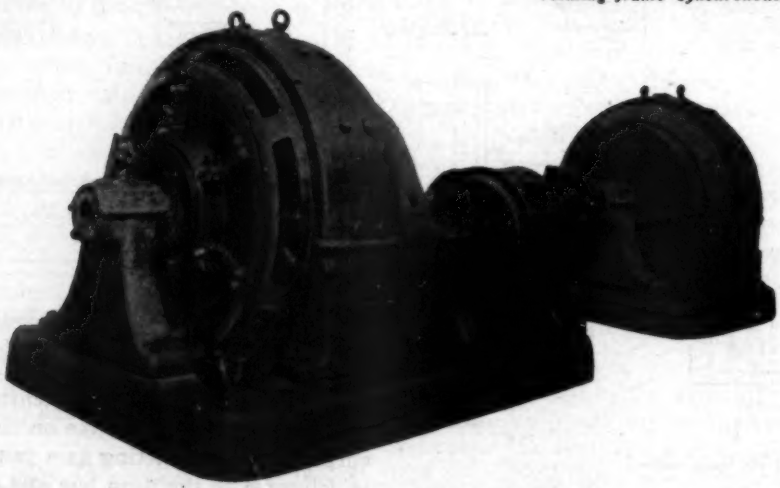
The Rotating Frame Type Sectional Drive is illustrated in the reproductions on the following page.



Sectional paper machine drive with rotating synchronous motor

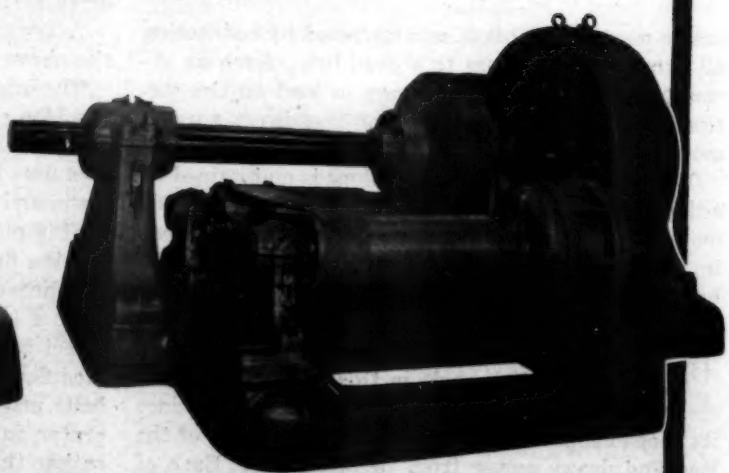


Reel section for paper machine drive with rotating frame synchronous motor



Sectional paper machine drive with rotating synchronous motor

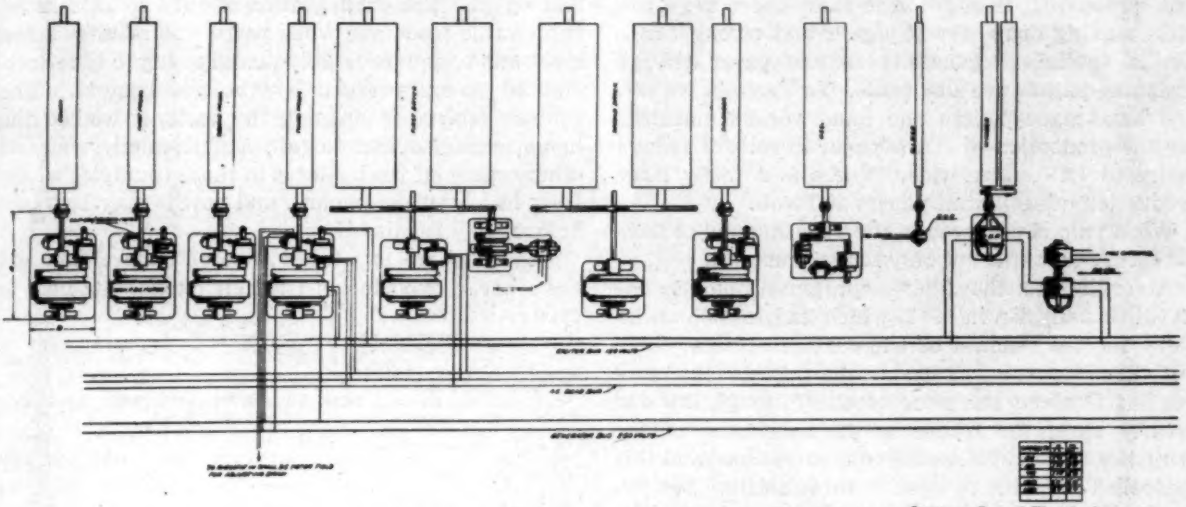
New sectional paper machine drive using synchronous motor and regulator tie-in device



Courtesy—General Electric Company

Motor unit for sectionalized drive of newsprint machine

A further modification of the General Electric drive applies the principle of the T D regulator for each section of the paper machine. It operates in such a way that the full energy of correction will be instantaneously available in case there is any change in load or tendency to change in speed. This regulator type of drive (shown in the following cut) like the original type, is dependent upon the synchronous motor tie-in for maintaining constant speed on the main driving motor.



Courtesy—General Electric Company

Rotating frame type sectional paper machine drive

The Pulp and Paper Industry of Italy

By F. A. SHEPLEY
Staff Correspondent, American Trade Press

OF THE highest class paper mills which sprang into being after the Arabs had introduced into Europe the art of making paper was that of Fabrian at Ancona. The cradle of the hand-made paper trade. The trade has never been allowed to die out and is still one of the most flourishing in Italy.

Concerning this trade in Italy, I would remark that one of the greatest difficulties to be met with is the lack of definite statistics which, till now, has prevented national cohesion. At the same time it makes it extremely hard to make satisfactory inquiries.

This lack of method has been at last felt and in recent years more attention to this important question has been given. The Minister of Agriculture's report give the following information: The Italian paper industry, in 1862, had but 59 machines and 687 vats. Again in 1876, though the number of machines had increased three-fold, yet the number of vats still largely predominated and reached the number of 866. Then came a change so that in 1896 there were 169 continuous machines, 220 drum machines and only 216 vats, which improvement continued so that 1913 saw in work 268 continuous machines and 338 drum machines, while the number of vats had decreased to 108.

These figures have not changed much since this date owing to the war. All projects for improvements and extensions had to be shelved. However, in order to adapt themselves to the new conditions, several of the old machines were scrapped by the industrials who joined forces and finally did away with the old vat system. New and more productive machines were installed while there are many just now being set up and will shortly be running.

My informant states that there cannot be a sensible increase for a few years, but that in compensation the paper mills are working more intensively than ever before, while the industrials have set to work with a will to renew their plants and enlarge their establishments. The old go-as-you-please system has given way to up-to-date methods of organization. The smaller firms are being absorbed and the bigger ones are being converted into limited companies. With the formation of the new societies the machinery is thoroughly overhauled and, if unprofitable, scrapped.

As to the number of the paper mills, they are divided in the following regions:

Tuscany over.....	100	Lombardy over.....	70
Lugurie over.....	70	Piedmont over.....	45
Campania over.....	45	Venice over.....	30
Lazio over.....	28	Emilia over.....	10

There are eight or nine regions with less than ten each.

Piedmont boasts of the largest and most modern mills, especially at Novara, which are equipped with continuous running machines for the production of white papers. Common wrapping paper comes chiefly from Genoa. Lombardy manufactures in large quantities press papers, writing, wrapping papers and cardboard. 'In addition to these there are a few mills making drug stores' papers and strong cards. Emilia specializes generally in fine paper though wrapping papers are also made. In Tuscany we still find hand-made papers and hand-worked machines for the production of straw paper in rolls of from 1 metre to 1.20 metre wide. There is a fairly large production of newsprint papers at Tivoli.

Wood pulp is produced in the Trentino and at Isola del Liri near Rome, but only for internal use.

According to the figures presented before the Royal Commission in 1913, which had to hold an inquiry for the renewal of the customs tariffs, there were 28,000 people engaged in the trade. This number is still about the same because, though the war greatly upset the trade, on the conclusion of the armistice the eight-hour day was introduced and this compelled the mills to work in three shifts. The following list is taken from the statistics published by the Papermakers' Association for the years 1913, 1914 and 1915:

	1913	1914	1915
Paper without wood pulp, metric quintals	394,351	330,772	375,774
Paper with wood pulp, metric quintals	717,941	807,889	706,115
Press papers, metric quintals	337,007	401,612	429,088
Wrappings, metric quintals	666,261	691,725	619,023
Straw paper, metric quintals	505,692	505,778	566,607
Cardboard, metric quintals	200,973	214,511	271,269
Total	2,822,225	2,952,287	2,967,876

Since this last date we can only guess what the production has been, because the statistics were discontinued. The supply of cellulose was reduced enormously owing to relations having been broken with Germany and Austria, to the scarcity of tonnage and to the submarine warfare. Thus from 861,023 metric quintals representing the importation for 1913, we descend to 174,996 quintals imported in 1918.

Calculations made from information obtained from various sources give us the following production for the years 1919 and 1920:

	1919	1920
Paper containing more or less cellulose	672,000	1,052,000
Straw paper and ordinary cardboard	1,600,000	1,600,000
Total, metric quintals	2,272,000	2,652,000

The capital invested in this industry just prior to the war was calculated at about lire 80,000,000 in buildings, plant and fixtures, with another lire 80,000,000 as working capital. This is now calculated in 1923, at quite five times the old amount and is regarded as permanently fixed (lire 800,000,000 at the present rate of exchange is just under $40,000,000).

Salaries and wages have increased from lire 18,865,000 in 1913 to lire 115,000,000 in January, 1923. It will be seen that though the wage sheet is heavy, yet it is light enough to afford Italy cheap labor compared to what American mills must pay.

Pre-war importation was principally from Germany and Austria, the latter supplying a considerable quantity of board, too. This importation of board was 89.85 quintals to each 100 quintals of domestic make.

The principal outlets for the Italian article were, in the order mentioned, South America, the Levant and Egypt. The conflagration of 1914 to 1918 interrupted this trade and when peace was re-established Italy was very unfavorably placed owing to the short-sighted policy pursued by the government. The cabinet delayed in opening the ports, it wished the home market prices to fall, and it calmly watched others carry off the business in those countries where Italy had been paramount, and now it may be years before Italy regains them.

Following are two tables, one of importation and the other of exportation (in metric tons) for 1914 to 1920:

TABLE OF IMPORTATION (in metric tons.)

	1914	1915	1916	1917	1918	1919	1920
White or colored paper in pulp, plain and unlined in loose sheets	3,730	1,387	1,791	1,094	2,656	4,387	9,874
Special or worked papers, colored, gilt, wall, photographic, blottings	1,426	567	525	606	485	550	1,720
Wrappings (straw, pulp, cellulose)	890	362	42	46	12	540	312
Cardboard (asbestos, fine boards)	16,323	6,895	6,928	14,007	16,257	7,360	12,698
General total	22,369	9,211	9,286	15,753	19,410	12,837	24,604
Total value in million lire	8.6	4.6	10.3	25.8	38.2	35.7	71.4

EXPORTATION TABLE (in metric tons.)

	1914	1915	1916	1917	1918	1919	1920
Whites and colored (in pulp)	6,401	16,067	15,315	6,306	2,208	3,684	5,601
Specials and worked	226	766	1,343	745	98	286	1,201
Wrappings	3,118	9,008	6,021	6,174	8,259	6,538	5,224
Cardboard	791	1,899	680	476	16	225	524
General total	13,536	27,740	23,359	13,701	10,653	10,733	12,550
Total value in million lire	6.9	15.1	32.6	32.7	27.2	38.5	54.1

The foregoing figures can be taken as representative of what is going on today, except for exportation which has probably exceeded the 1920 mark of 12,550 metric tons and can be calculated at approximately 13,000 to 14,000 tons. (The dollar in 1914 stood at 5 lire, while today it is quoted at 20.40 lire.)

Supplies and the War

The war proved a great trial for the paper industry of Italy, above all because it cut off her supplies of the raw materials which come from abroad.

Italy is without cellulose plants, though much money has been spent in several attempts to endow the country with this important branch of the trade. There is only one factory for the production of straw cellulose, and two paper mills which make cellulose from poplar and fir wood, but it is only for their own private use.

Prior to the war Germany and Austria supplied two-thirds while the remainder was furnished by Scandinavia, Switzerland and Roumania. The metallic mesh for the continuous machines of phosphor bronze used to be supplied by Germany, Austria and France. China clay is a British product, the resin comes from the United States, France and Greece, while Holland furnished the necessary fecula.

However, thanks to the energy of the industrials, substitutes were found for most of the articles required. To make up for the deficiency of cellulose, which fell from 86,000 metric tons to 17,500, rags, domestic machine-made pulp and paper waste were used. Mica supplied the place of China clay, and a home product made up for the shortage of sulphate of alumina.

Regarding machine-made wood pulp produced in Italy, no reliable figures are to be had, so we must have recourse to indirect calculations and as a base we shall consider the requirements for 1912.

		Approximative
64,919 metric tons of paper with pulp required	35% =	22,730 m. tons
40,177 metric tons press paper required	70% =	28,126 m. tons
65,533 metric tons wrappings and packings required	15% =	9,820 m. tons
17,769 metric tons common cardboard required	51% =	9,200 m. tons
		69,876 m. tons
Deduct that imported		10,000 m. tons
Produced domestically		59,876 m. tons

Towards the end of 1922 it was ascertained that the power used amounted to some 49,907 H. P., distributed as follows:

Steam	4,602
Hydraulic	33,750
Electricity	10,082
Gas	1,473
Total H. P.	49,907

The price of rags has increased enormously due to the great shortage which has been experienced. Rag paper is used for cigarette paper, book paper, stamps and documents and writings and is, save for a small part supplied to the state, for exportation.

Cigarette papers are shipped to the Orient, especially to Egypt. Bible paper (a fine, thin book paper) is chiefly destined for England, a little of it finding its way to America. A large trade is done with South America in letters and envelopes, loose and boxed, drawings and ledgers. Also a fair amount of bank note papers are exported.

The rag merchants succeeded in persuading the government to allow them to export and, though the crisis has not yet ceased, the increased exportation of rags is regarded with alarm by the paper trade, for it has a decided influence upon prices.

The vegetable rag export rarely reached 120 tons a few years ago, but 1922 saw a jump to nearly 700 metric tons.

On the other hand, imports have dropped considerably, in 1921 there being but one-quarter of those of 1919 and, in consequence of this phenomenon, prices have soared greatly.

One curious thing should here be noted and that is, owing to the general crisis in all branches of trade, and owing to the strong demand for old paper and books, all the wholesale and retail stationers have got rid of all their old stocks, and this has had the effect of keeping the mills busy in replacing them with new stocks. Again, as prices are high the small men buy only from hand to mouth and this has driven excess production abroad, particularly to South America. The makers are striving hard to capture the Indian market and quite a fair trade has been initiated. In South America every facility is offered to the buyer and orders which seemed likely to pass to the United States have been obtained by the Italian rival.

As to Italy as a market for America, it is said that there is a possibility, but only in extra fine writings and high class stationery for the moment; but that the prospects at no very distant date are distinctly good for America.

Handling of Fuel Oils in Bulk Quantities

By ROBERT JUNE, M. E.

RIGHT at the outset let us define the term "bulk" used in the title of this article, as referring to conditions where the equivalent of one or more tank cars must be handled within a 24-hour period and let us assume that storage facilities have been provided so that we are concerned only with the details of handling.

The tank car from which we receive our oil has a capacity of 7,000 to 12,800 gallons, depending, of course, upon its size. Standard equipment for such cars consists of 4-inch discharge pipes, located in the center of the car and controlled by a valve, the stem of which extends to the top of the car. Where gravity discharge is possible, it is desirable to place 10-inch pipes in a vertical position in the center of the rails and discharge the oil through these pipes into the storage tank. If several cars are customarily received at the plant at the same time, it may be well to put in several of these pipes, in which event they should be arranged with 43-foot centers, as this is the length of the most commonly used tank cars. Threaded, or flanged caps, preferably threaded, should be provided for the 10-inch pipes, when not in use. The 4-inch discharge pipes of the car can be located directly over the 10-inch pipe with the result that when the car is properly heated its contents may be discharged in one-half to three-quarters of an hour.

It is not customary to provide a strainer at the point of discharge from the tank car. The 10-inch line should have a gate valve at the entrance to the tank or at the entrance of each tank, if branches are provided to more than one tank. As a matter of safety and also to comply with the insurance rules of some states the filling pipe should enter the tank near the bottom, thus providing an oil seal which will

prevent the possibility of any gas within the tank being ignited by means of flame carried through the 10-inch line.

Where permanent gravity and discharge facilities, such as have just been described, cannot be installed the alternative is to provide flexible hose which can be attached to the discharge pipe. Where a 3-inch hose is used and reliance is placed on gravity discharge, it will ordinarily require three or four hours to empty the car. When time is an object, in that labor may be saved and the cars unloaded more rapidly and where it is necessary to clear the right of

Fig. 1—Electrically driven oil pumps reduce time for emptying tank cars

way, it will ordinarily be found more profitable to pump oil out of the car than to rely on gravity feed. Thus, with a small rotary pump the contents of the car may be discharged in half an hour, where three or four hours are required, as noted, where gravity alone is relied upon.

As illustrating in a graphic way the difference between gravity and pumping—see Fig. 1, showing the use of a pump for filling drums from a tank car. It took eight minutes each to fill the drums by gravity. A number nine rotary hand pump did the same work in three and a quarter minutes, besides saving the lifting of the drums from the car to the wagon.

Of course, where storage tanks are located above the tank cars it is necessary to resort to pumping. For this purpose a rotary pump with 3½-inch connection is recommended. Such a pump will deliver 200 gallons per minute, with a suction lift of 18 feet against a maximum pressure of 75 gounds.

Gauging the Oil

Probably the handiest method of determining the quantity of oil delivered is to gauge the receiving tank. Before this can be done the actual capacity of the tank for different levels will have to be accurately ascertained, either by placing known quantities into it or by making accurate measurements and then calibrating the gauge. After this has been done a schedule must be worked out, showing the capacity of the tank with oil at varying temperatures.

The point is this, oil, if purchased by the gallon, should be specified as being delivered at a pre-determined temperature, say 68 degrees F. Now, if the oil is actually loaded into the tank at this temperature and the discharge at the same temperature, there will be no discrepancy in the measurement. However, if it should be loaded in at 120 degrees F. and taken out at 68 degrees F. there would be a marked discrepancy. Conversely, since oil is bought on a basis of 68 degrees F. it will not do to measure it upon receipt at 120 degrees F. Therefore, if the oil is preheated the discharge temperature in the receiving tank should be noted and due allowance made for expansion.

It is poor practice to undertake to measure the quantity of oil in a tank by means of a float connected to a chain extending over a pulley and connected to a counter weight sliding on a graduated scale. This arrangement does not come within satisfactory limitations and it possesses the very great objection of providing a vent pipe, thus creating a dangerous fire hazard. Insurance companies generally object to such construction and specify that there shall at least be a screen made of fine wire gauze placed in the pipe to prevent the flame from passing through. It is best, however, to avoid this type of construction entirely and to use a connecting gauge which does not require any permanent direct connection with the atmosphere.

It is, of course, necessary to heat heavy oil whenever it is moved. This means that storage tanks may be equipped with heating coils. Where tanks are located above the ground the area of the heating coils will be largely determined by the climate. Where tanks are buried approximately 35 feet of ¾-inch steam pipe should be provided for each 10,000 gallons capacity.

It is quite a common mistake to bring oils to too high temperatures when endeavoring to move from storage. This should be avoided because it wastes steam and therefore fuel, unnecessarily, and it does not make oil any easier to handle above a certain point. Should there be any water in the tank, as frequently happens, it may produce steam bubbles in the oil, causing foaming.

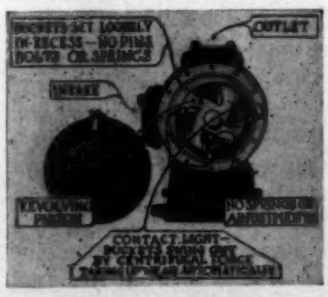


Fig. 2—Sectional view of rotary pump suitable for handling fuel oil

A good average safe temperature for handling oil out of storage is 125 degrees F. In laying out steam

lines provision should be made for a ¾-inch line to the tank car.

Best Pump for Oil Service

Rotary pumps are in use by thousands for handling oil and their popularity is well deserved. The rotary pump has so frequently demonstrated its advantages over the piston pump for this same service that it is hardly necessary to describe at length the different actions of these two principles. Suffice to say that the rotary pump will handle a larger volume of liquid with less power than the piston pump. This is so because the action of the rotary pump is continuous.

When once started there is no stop or hesitation in the flow of liquid, whereas in reciprocating pumps, when the piston has reached the end of the stroke, it stops and with it stops the flow of liquid. It is a well established fact that it takes more power to intermittently start the movement of anything than it does to keep it moving when once started.

The three advantages of rotary action are: (1) Continuous flow with greater pumping volume; (2) saving in power, with consequent reduced cost of operation; (3) less slippage.

A typical rotary pump is illustrated in Figs. 2 and 3. It will be noted that the buckets are hung in the rotor in such a way that they ride in the cylinder wall with extremely light contact, similar to a balanced flange valve on a steam engine. An important feature of this action is that the buckets take up their wear automatically, thus making a perfect seat on the cylinder wall at all times. The rotary pump having a piston suction need not be primed.

The piston revolves with the shaft, causing the buckets to hold out against the cylinder by centrifugal force and gravity. This exhausts the air from the suction line, allowing the atmospheric pressure to force the oil into the pump and fill the extension chamber. The oil is forced out of the discharge as it cannot carry by the discharge port, owing to the fact that the only oil that will carry by is that which fills the recesses in the piston and this acts as an oil packing, keeping the pump at all times suction tight.

Fig. 3—General view of rotary pump

Where heavy oil is to be burned as fuel in boilers special attention must be paid to the design and layout of the piping system between the tank and pumps, and between the pumps and the burners. All of the pumps should be located as close to the tank and at the same time as close to the floor as possible in order to reduce friction and suction lifts.

The intake line should be at least half an inch larger than the pump suction. The use of elbows should be avoided, long sweep bends being used in their places. Where the intake pipe lies along level ground for some distance it should be installed with a slope upwards of about one foot in one hundred toward the pump. Care should be taken to see that pipes are placed either in dry, well drained ground, or in an equally well drained wood or concrete trenches. In the northern states piping subject to frost should be insulated. Discharge pipes from pump to burner should also be insulated.

It is quite frequently the practice to place a small live steam line inside of the discharge line to supple-

Fig. 4—Showing typical installation for handling fuel oil

ment the oil heater. In such cases expansion at the point where the small line is introduced is taken care of by provision of stuffing boxes. By putting in this small steam line it is possible to heat the oil in the discharge line when starting up a cold installation. This is an important point as it greatly facilitates handling the heavy oil. Another piping detail which will greatly facilitate handling, is to run a circulating line from the far end of the discharge heater back to the suction tank. This makes it possible to circulate oil entirely through the system in advance of firing the boilers—quite an advantage with heavy oils.

For piping of this sort standard weight pipe and fittings can be used. However, real care should be exercised in selecting the valves, as cheap valves have a great tendency to leak.

In putting in piping for oil, joints should be made up with compound not affected by oil. For this purpose a mixture of litharge and glycerine is frequently used. However, to secure best results this combination should be mixed in very small quantities and used as rapidly as mixed for the reason that it sets very quickly and is, of course, of little value if the thread is not screwed on and the joint made before the compound has hardened.

Identification of Pulp Woods

Spruce, hemlock, balsam fir, tamarack, and jack pine are the five principal softwoods used for pulp in the Lake States, Northeastern States, and Southeastern Canada. These woods differ considerably in price, quality, and pulping properties. The following key, prepared by the Forest Products Laboratory of the U. S. Forest Service, Madison, Wis., gives the distinguishing characteristics which are most obvious to the unaided eye.

I. Exudations of resin, pitch pockets, and pitch streaks common in the wood. (This does not refer to the bark.)

(a) Heartwood white and same color as sapwood; odor not pronounced; bark thin and scaly .....SPRUCE

(b) Heartwood distinctly darker than sapwood.

1. Sapwood mostly less than 1 inch wide; heartwood russet brown; odor not pronounced; exudations of resin scant; bark light reddish brown, thin scaly, not ridged..... .....TAMARACK

2. Sapwood mostly over 1 inch thick, heartwood reddish brown; odor of wood like pine pitch; exudations of resin usually abundant; bark dark, thick and ridged, especially at butt .....JACK PINE

II. Exudations of resin, pitch pockets, pitch streaks, and pitchy odor absent. Heartwood and sapwood of about the same color.

(a) Wood light brown with reddish tinge; bark usually ridged and scaly except on very small stems, without resin blisters.... .....HEMLOCK

(b) Wood white; bark usually thin, fairly smooth, with resin blisters.....BALSAM FIR

Pointers for the Engineer

By W. F. SCHAPHORST, M. E.

How Much Fuel Does a Clean Boiler Save?

HERE is an interesting and valuable chart for finding the fuel saved by keeping boilers clean. Simply zigzag across the chart three times with a straightedge or fine black thread, as indicated by the dotted lines drawn across, and the per cent of fuel saved is found in the last column at the right—column G.

For example, if the temperature of the chimney gases before cleaning was 680 degrees F., and after cleaning 480 degrees, and if the heat value of the coal is 12,000 B. t. u. per pound, wnat is the percentage of fuel saved?

Connect the 580 (column A) with the 12,000 (column C) and make a note of the figure intersected in column B. In this case we find the figure in column B to be 70 per cent. Now begin at the 12,000 (column C) and run a line through the temperature difference (before cleaning and after) in column D, which is easily figured to be 100 degrees. Continue the line until it intersects column E. Column E, you will note, is intersected at 3.8 per cent. Now from this point (column E) run through the figure in column F, which is the sum of the figures obtained in columns B and E. In this example the sum is (70 plus 3.8 per cent) 73.8 per cent. The continuation of this line through column G gives the answer as 5.15 per cent, which is the percentage of fuel saved.

The instructions on the chart itself tell just what to do as you go along. Each column is fully explained, excepting columns B and E, which are to be added together for use in Column F. In zigzagging across the second line from column C to column E begins where the first line ended—at the 12,000 B. t. u., the 13,000, or whatever it happens to be. In this example it is 12,000 B. t. u. In the same way the third line from column E to column G begins where the second one ends. The writer has experimented with this chart to find which is quicker—the chart itself or the formula on which the chart is based. In every instance I found the chart to be much quicker. The only mathematical operation involved—adding two simple numbers—requires very little thought and can usually be done mentally.

Not long ago I developed and published a formula for computing the fuel saved by cleaning boilers. This formula met with gratifying approval. One correspondent, however, asked if I could alter the formula and get rid of the "boiler efficiency factor" which was contained in the formula. Many operators of boilers haven't an inkling regarding their boiler's efficiency, and as soon as one begins to talk efficiency to them they shrug their shoulders and give up the task as hopeless. With this correspondent's suggestion in mind I sought out some good representative steaming tests where I knew the firemen and engineers did the best they could and derived this formula:

$$\frac{100\,(T-t)}{0.22H-0.37T-t} = \text{Per cent of fuel saved, assuming 18 pounds of air per pound of fuel.}$$

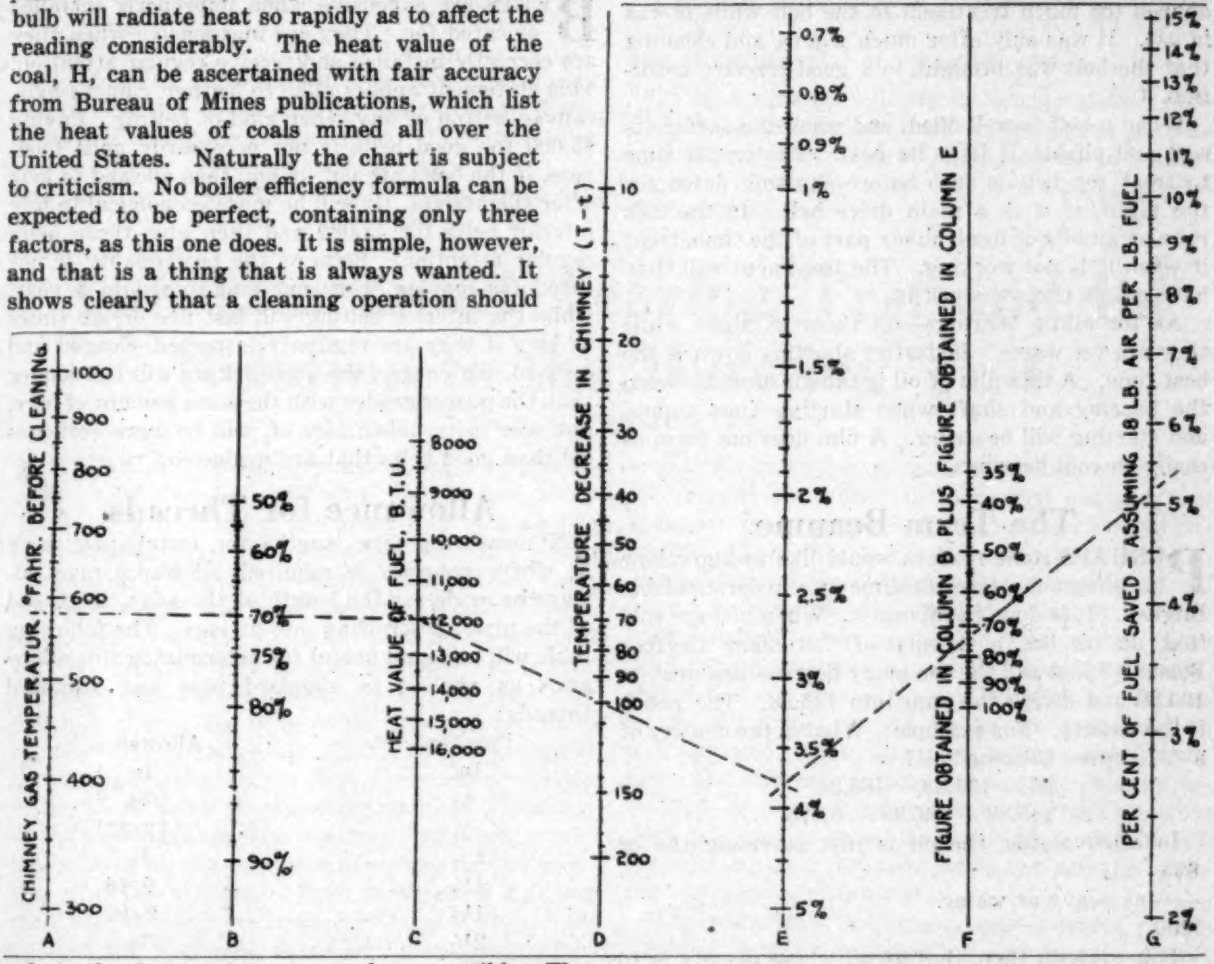
Where T = the temperature of the chimney gas before cleaning.

Where t = the temperature of the chimney gas after cleaning, degrees F.

Where H = heat value of fuel in B. t. u. per pound.

This is the formula upon which the accompanying chart is based. It contains three most important factors, all of which are usually known or deter-

mined without great effort. T and t can be found by means of a pyrometer or a thermometer properly placed in the gases. If a thermometer is used don't place it close to any comparatively cool body or the bulb will radiate heat so rapidly as to affect the reading considerably. The heat value of the coal, H, can be ascertained with fair accuracy from Bureau of Mines publications, which list the heat values of coals mined all over the United States. Naturally the chart is subject to criticism. No boiler efficiency formula can be expected to be perfect, containing only three factors, as this one does. It is simple, however, and that is a thing that is always wanted. It shows clearly that a cleaning operation should



reduce the temperature as much as possible. The lower the final temperature the better. It also shows that it is desirable to use high-quality coal—coal of high heat value.

The range of this chart is great enough to include most boilers. The efficiencies range from 50 to 100 per cent. The maximum temperature decrease is 200 degrees F., which is sometimes exceeded but seldom is an average decrease. Column G shows that the chart will compute savings all the way from 2 to 15 per cent. Should your problem be so unusual as to fall outside of this chart, which is improbable, recourse may be had to the formula above.

Simple Way to Figure Density

THE density of an oil or any other liquid can be determined with accuracy without the use of a hydrometer. If you have an accurate weighing instrument you can do a more accurate job in fact than with a hydrometer.

In a nutshell, this is the method:

(a) Weigh a clean empty jug.
(b) Weigh again when filled with water.
(c) Weigh again when filled with oil.

The density can then be determined by using this simple formula: $\text{Density} = \frac{c - a}{b - a}$

This, you will note, is nothing more or less than dividing the weight of a certain volume of the oil by the weight of the same volume of water. If you have accurate and delicate weighing balances I would suggest that you use a small vial for this test. If you have nothing but large scales for weighing heavy objects you can do the test very well by using a large or ordinary jug as suggested above. The temperature of the water, oil and jug should all be the same while doing the test. If possible, the temperature of all three should be 60 degrees Fahrenheit, as that is the standard.

When to Treat the Belt and Oil the Bearings

MANY belt users make the error of waiting for belts to slip before applying dressing and then are liable to apply so much that the belt fails to pull

properly for some time on account of the interval required for it to absorb the dressing.

I know of an instance where a 600 h. p. engine was laid up for almost half a day, because the engineer applied too much treatment to the belt while it was in use. It was only after much wiping and cleaning that the belt was brought to a good tractive condition.

When a belt is well filled, and when the surface is soft and pliable, it is at its best. The proper time to treat the belt is just before shutting down for the night, if it is a main drive belt. If the belt runs on an idle or loose pulley part of the time, treat it when it is not working. The treatment will then have ample time to work in.

As for oiling bearings—oil them at night while they are yet warm. Just after shutting down is the best time. A thin film of oil is thus insured between the bearing and shaft when starting time comes, and starting will be easier. A film does not form so easily on cold bearings.

The Term Beaume

PERHAPS some readers would like to know how to convert the term Beaume into understandable English. It is done in this way: When you are told that an oil has a density of "so many degrees Beaume," just add the "so many degrees Beaume" to 135.88 and divide the sum into 145.88. The result is the density. For example: What is the density of a "31 degree Beaume" oil?

$$31 + 135.88 = 166.88$$

$$145.88 \div 166.88 = 0.875$$

In other words, the oil is just seven-eighths or $\frac{875}{1000}$ as heavy as water.

It is evident, then, that an oil whose density is 10 degrees Beaume is just as heavy as water, because

$$10 + 135.88 = 145.88$$

The Van Stone Joint

T is far easier to make a good single Van Stone joint than it is to make a multitude of good joints using pipe fittings. Highly skilled labor is less essential with the modern Van Stone type. This joint has many worthy points to recommend it and if much piping work is contemplated in and about the paper mill the writer suggests that the Van Stone joint be given serious consideration.

One Hundred Per Cent Pipe Flow Area—For example, the square lap Van Stone joint, together with welded nozzles and welded bends, make an ideal combination for unretarded flow of gases or liquids. There are no rough projecting ridges inside the pipe to cause eddy currents, catch dirt, or reduce the sectional area of the pipe. A properly finished pipe having 85% of the area of a riveted pipe will deliver about the same amount of water. The friction head is about 30% less.

Regarding Belt Care

BELTS are expensive when improperly installed or cared for. They are inexpensive when they are correctly installed and receive regular attention. This statement applies alike to leather, camel's-hair, canvas, cotton or any other kind of belting. Paying $5,000 for good belts is not necessarily good business, if the belts are put up and then allowed to look after themselves. It will be more economical to buy inferior belts for $3,000 and then give those belts regular attention. Belts of the best quality if not cared for may be worn out and ruined in a year, while the inferior belting will last five or six times as long if they are regularly inspected, cleaned and dressed. Of course, the good belting will last longer than the poorer grades with the same amount of care, but poor belts, taken care of, will be more economical than good belts that are neglected.

Allowance for Threads

IN measuring pipe lengths for installation work where accuracy is required, allowance must always be made for the length of threads at each end of the pipe for screwing into fittings. The following table will be found useful for determining this allowance as applied to standard pipe and standard threads:

Pipe Size In.	Allowance In.
½	⅜
¾	13/32
1	½
1¼	9/16
1½	9/16
2½	⅞
3	⅞
2	19/32

Cast Iron and Bronze

GEORGE J. STUART says, in National Engineer: "Neither of these materials should be used in superheated steam lines for the reason that they will deteriorate after a time, losing their strength and changing their form."

The Coal Situation

I have a letter from a prominent manufacturer of power plant equipment in which he says:

"A reduction in the cost of soft coal for power plant use evidently will not be experienced for a long while. This is indicated by the new agreement recently signed by the operators and miners which is practically the same as the old agreement which expires shortly."

About the only answer to this is, "Economize." The writer will make so bold as to say that there is not a single power station in the United States or

anywhere else that cannot be operated more economically than at present. Improvements are continually being made. Efficiencies are on the increase. Most of us can do better if we want to.

Flow of Water

The formula most quoted today for determining loss in head due to the flow of water through pipes, accredited to Saph and Schoder is: Loss in head in feet per 1,000 ft. of pipe $= 0.38 \frac{V\ 1.86}{d\ 1.25}$ in which V is the velocity in feet per second and d is the internal diameter of pipe in feet. Sometimes it is easier to use in this form: $H = 8.47\ V\ 1.86 \div d \frac{1.25}{\text{in.}}$ where d in. is the diameter of the pipe in inches.

To determine the velocity in feet per second, multiply the gallons per minute flowing through the pipe by 0.408 and then divide by the square of the internal diameter of the pipe in inches. One cu. ft. = 7.4805 U. S. gallons.

The Elmendorf Tearing Test and Its Relation to the Bursting Test

BY E. SUTERMEISTER

NEARLY every use to which paper is put requires that it shall offer more or less resistance to tearing, and some sort of a test to show this property is in use by practically every manufacturer of paper as well as most of the users of this product. The importance of this test has been recognized ever since paper has been made, yet until very recently the only method available was to tear the paper between the fingers and note the resistance which it offered, the form of the tear, the length of the fibers, etc. The results of this method could not be expressed numerically and their interpretation depended so much on the experience and judgment of the person making the test that they were of relatively little value as a means of comparing the products of different plants. Even in the same mill, one man had to make the tests every day if they were to have the maximum value, and any change from one person to another tended toward confusion of results.

Within a comparatively recent period a number of tearing testers have become available and are being more or less generally used. The most popular of these, and the one most generally thought of when the tearing test is mentioned, appears to be the Elmendorf tester. The principle upon which this instrument operates is that the work done in tearing a sheet of paper measures indirectly the force required, and hence the strength of the paper. The instrument has been described in the technical journals and has been studied by the Bureau of Standards, who report that it is built on sound mechanical principles, is calibrated correctly and will perform satisfactorily provided the number of plies to be torn is specified and carefully observed for different grades of paper.

It has been the experience of most persons who have tested paper that there is no single test which can be relied on exclusively and that in judging its quality for any given purpose a considerable number of different tests have to be carried out and final judgment based on a sort of composite of the various results. Since this is true it is important that the interrelation of the different tests should be as well known as possible, yet in spite of the work which has been done to bring out these relationships, there is still much confusion among the older instruments, and it has not proved possible to work out factors which will enable the results on one instrument to be calculated when those on another are known. Since the Elmendorf tester has been so recently developed, even less is known about the relation of its tests to those of other instruments, hence the following comparisons of the tearing test and the bursting test may be of interest.

The work was performed upon samples of unbleached sulphite representing the average output from a number of digesters. Each sample of wet pulp was first thoroughly mixed and then made into sheets which were allowed to air dry. From this air-dry fiber a sample was weighed out, broken up in water and beaten in a pebble mill in a standard manner. From the beaten fiber four sheets were made on a sheet machine and allowed to dry in the air on racks. Each sheet was cut in two on the diagonal and half tested in five places for bursting strength with a 140 lb. Ashcroft tester. From the other halves of the sheets strips 2½ inches wide were cut and all four were tested together in the Elmendorf tester, six tears being made on each sample.

It is well known that the relative humidity of the atmosphere surrounding the samples at the time they are tested has a considerable influence on the results in the case of the tearing test, and a lesser influence on the bursting test. To get the most reliable comparisons, therefore, the tests should have been made under carefully controlled humidity conditions, but as a constant humidity room was not avail-

able, all tests were made under prevailing conditions. As the period during which the samples were tested, Oct. 5 to Jan. 5, was one in which the windows would normally be kept closed, it is safe to assume that the relative humidity ranged from about 15 percent to 40 percent. No very great difference in strength is therefore to be expected on the score of variations in humidity, but there is this possible source of error which could not be guarded against.

The results of this series of tests are given in the following table:

Number of sample	Bursting Test Lbs. Ashcroft	Tearing Test Dial reading for 4 sheets	Number of sample	Bursting Test Lbs. Ashcroft	Tearing Test Dial reading for 4 sheets
1	63.3	44	36	81.5	45
2	65.7	37	37	79.8	46
3	62.8	46	38	75.4	41
4	68.9	40	39	79.9	42
5	73.6	38	40	74.0	41
6	69.1	44	41	79.5	38.5
7	67.3	48	42	74.0	37
8	67.4	48	43	67.5	37
9	71.7	39	44	66.5	43
10	72.7	41	45	68.8	38
11	67.0	38	46	70.8	42
12	63.9	35	47	75.9	40.5
13	70.7	41	48	73.2	43
14	70.8	40	49	70.8	41
15	69.6	42	50	69.5	43
16	70.1	42	51	75.3	43
17	66.5	42	52	71.8	38
18	74.6	41	53	75.7	41
19	78.3	39	54	67.4	37.5
20	61.1	46	55	65.4	48
21	69.6	38	56	73.2	41
22	68.7	40	57	76.5	40
23	68.9	41	58	74.3	41.5
24	76.3	41	59	76.9	40
25	75.8	41	60	71.2	40
26	71.5	45	61	78.6	38
27	80.3	41	62	76.6	42.5
28	77.9	45	63	64.1	37
29	72.3	44	64	64.9	44
30	74.6	41.5	65	66.6	45.5
31	72.7	38.5	66	58.3	41
32	71.6	44	67	67.2	39.5
33	76.5	40	68	65.0	44
34	77.7	41	69	64.6	45
35	78.0	43.5	70	60.8	47

Number of sample	Bursting Test Lbs. Ashcroft	Tearing Test Dial reading for 4 sheets
71	62.8	53
72	72.4	44
73	74.4	51
74	62.7	43
75	68.6	53
76	71.0	40.5
77	65.4	44

Bursting Test, Maximum	81.5
Bursting Test, Minimum	58.3
Tearing Test, Maximum	53
Tearing Test, Minimum	35

These figures are shown graphically in the accompanying chart, Fig. 1, and a study of this proves that there is no constant relation between the bursting and the tearing strength. Out of the seventy-six samples tested, the bursting and tearing tests both rise and fall in twenty-seven cases, while in forty-one cases one test rises while the other falls. Eight samples show no change in strength in one or the other of the tests and so cannot be compared. Considering both those classes in which the changes are in the same direction or counter to each other, it is seen that there is not even any definite relation between the magnitude of the changes; sometimes the change in tearing strength is greater and sometimes that of the bursting strength. On the whole there seems to be a slight preponderance of evidence that the tearing test rises as the bursting test falls, and vice versa, but there are so many exceptions to this rule that it is absolutely impossible to predict one test after having made the other.

During this series of tests the paper made from this fiber, after it had been bleached, was very carefully inspected, though no records of physical tests were made. It was the opinion of those making the inspections that the bursting test of the unbleached pulp was more indicative of the character which the pulp would impart to the finished paper than was the tearing test. This conclusion was based on the manufacture of book paper and might not hold if the fiber was given a beating treatment which would enable it to be made into some other grade of paper, as bond, for instance.

Special Cooks

In addition to the preceding tests, data were obtained on nine special cooks which were made on the same size charge as the others, but which were cooked under rather different conditions, which need not be detailed here. In this series the air-dried, unbleached fiber was beaten in the pebble mill for four different lengths of time—½ hour, 1 hour, 1½ hours and 2 hours, and the beaten fiber made into sheets as usual. The bursting and tearing tests are given in the following table, the bursting test being expressed as pounds on the Ashcroft tester, while the tearing test is given as grams for an average of six tears of four sheets at a time:

Sample No.	Time of beating	½ hour	1 hour	1½ hours	2 hours
1	Bursting	40.8	54.2	67.9	78.8
	Tearing	249.6	228.0	228.0	242.4
2	Bursting	37.8	59.1	74.0	75.6
	Tearing	312.0	309.6	283.2	267.2
3	Bursting	45.0	60.8	71.3	82.1
	Tearing	246.4	243.2	256.0	256.0
4	Bursting	37.3	61.8	74.6	85.1
	Tearing	350.4	368.0	291.2	320.0
5	Bursting	35.6	60.5	65.7	75.9
	Tearing	264.0	268.8	259.2	265.6
6	Bursting	43.6	60.5	77.0	79.4
	Tearing	308.8	291.2	296.0	297.6
7	Bursting	39.1	51.8	64.0	72.9
	Tearing	227.2	219.2	236.8	265.6
8	Bursting	39.0	66.4	74.3	75.3
	Tearing	324.8	316.8	328.0	342.4
9	Bursting	43.9	57.6	66.2	79.2
	Tearing	216.0	265.6	229.6	249.6

With all these samples the bursting test shows a continual increase as the time of beating is lengthened. The rate of increase is not the same for all the samples and there are a few unexplainable irregularities, but the tendency is very marked and in several cases the curves formed by plotting the bursting strength against the time of beating are practically parallel.

Examination of the figures for tearing test reveals quite a different state of affairs and brings out the very interesting fact that for a given sample of fiber the Elmendorf tearing test is practically a constant and is independent of the time of beating. Sample No. 2 is the only one which shows a consistent change in strength, which in this case is a gradual decrease in tearing strength as the time of beating increases, and even here the weakest test is only about 14 percent less than the strongest. Changes of strength in the other samples are comparatively slight and are apparently without significance as they seem to vary in either direction as chance directs.

This constancy of tearing strength is most astonishing when the characters of the various sheets are taken into consideration, for those made from fibers beaten only half an hour are soft, and when

torn by hand show long fibers and good "hang on," with a tendency for the sheet to split, while sheets made from fibers beaten two hours are hard and cockly and have a brittle tear. With all the fibers tested, two hours' beating hydrates or gelatinizes the fibers to such an extent that the fibers break instead of pulling apart when the sheet is torn.

Since the characteristics shown on tearing the sheets by hand are so vastly different that even the veriest novice could not fail to note large differences, and since the Elmendorf tester gives practically constant results for the same sheets, it naturally throws doubt on the value of the Elmendorf tester. If this instrument measures the work done in tearing the sample, it is evident that for a given fiber the work is practically the same whether it is expended in causing the partially beaten fibers to slip over each other or in actually breaking the highly hydrated fibers of the longer beaten stock. The characteristics of the fibers beaten for half an hour and for two hours are so different that they could not possibly be used in the same grades of paper, yet the Elmendorf tester does not indicate these differences. It seems that there is still a certain quality in connection with the tearing of paper which is not taken into account by the Elmendorf tester. If the tester could be modified, or a new type of instrument developed, to include this quality factor in its indications it would be a tremendous step in the right direction.

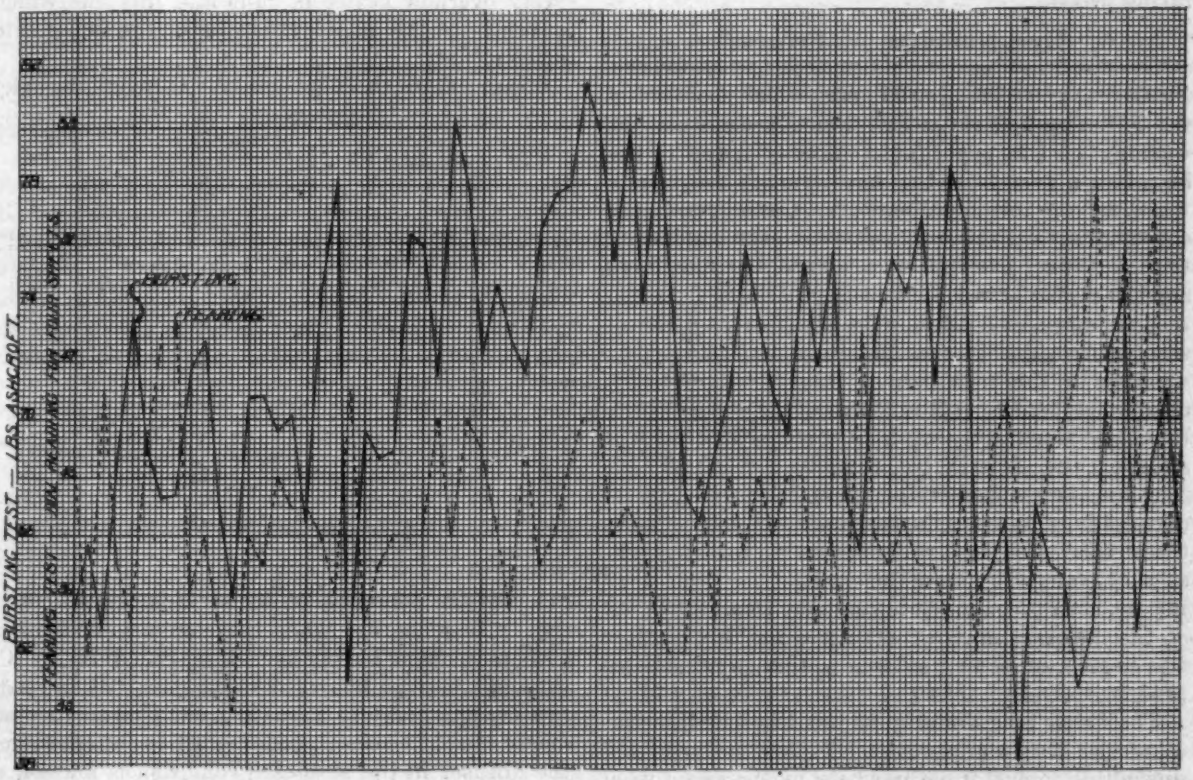


Figure 1

Purifying Soda Cellulose— A New Process

By F. KRENN

Wochenblatt fuer Papierfabrikation, 1924, 698-9

THE practical processes that are used at the present time for the manufacture of soda cellulose consist in the decomposition of the wood by means of caustic lye. In the manufacture of kraft pulp the raw materials are digested with caustic soda lye, which has a concentration of 18 degrees Baumé, the quantity of lye used standing in a definite relation to the weight of the wood. The pulp is finished within a period of approximately four hours, varying with the character and the softness of the wood fibers. The digestion is carried out under a pressure of nine atmospheres and the digester is rotated from time to time. After the digestion proper the pulp is degased which reduces the pressure from nine to four atmospheres. The waste gases, after passing through a condenser, are led through an auxiliary separating apparatus to remove the particles of liquor and paper stock that are entrained in them. The rather strongly diluted condensate which is obtained when a spray condenser is employed is treated with oxidizing agents and then blown into the evaporating tanks.

The residual four atmospheres of pressure within the digester is utilized in blowing the paper stock into the separator or diffusing apparatus, where it is

washed with water until it has been sufficiently well freed of its lye content in order to render it suitable for further treatment.

Most plants which operate on the aforedescribed process of manufacturing soda cellulose, regenerate the brown liquor which is separated in the diffusers in a soda recovery installation by evaporating the liquor in evaporators, rotary ovens, etc., and then fusing the soda in fusion ovens and dissolving the soda melt in waste waters collected in the manufacturing process.

Disadvantages of Process

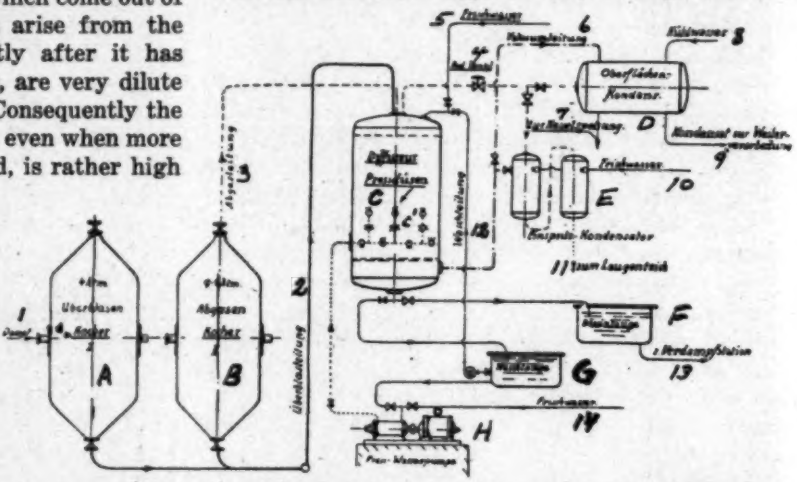
The disadvantages of this process are as follows. In the first place the brown liquors which come out of the diffusing apparatus and which arise from the washing of the paper pulp, directly after it has been blown over from the digesters, are very dilute when they go to the evaporators. Consequently the consumption of steam in the process, even when more than one effect evaporators are used, is rather high and the cost of evaporation is correspondingly expensive. In the second place due to the fact that washing of the soda pulp is necessarily prolonged, as it is essential that it be freed of as much as possible of the caustic lye that it contains, large-sized diffusing apparatus is required. Furthermore the auxiliary diffuser, while it acts as such, cannot be used for washing the soda pulp, which means that at all times one of the diffusers must be set aside for this purpose and hence cannot be used for washing the digested product.

The writer made an original investigation to determine whether it were not possible to get around these difficulties, in part if not in whole, by the use of what may be called a blow-off or blast system. It is believed that the introduction of this system does not afford any great technical operating difficulties, and furthermore the existing installations do not require any great alteration to make them available for use in the new process. It is evident that in order to conduct the process in a logical and economical manner the brown liquors, which are recovered from the diffusers and fed to the evaporators, must be of as high a concentration as possible, so as to save both steam and time in the evaporation process.

Details of the New Process

The various parts of the apparatus are shown in the accompanying figure. The digester (A) is set into operation first; after digestion has been finished the apparatus is blown, the pressure is released until it reaches four atmospheres and then the contents are blown over into the diffuser (C). After the digestion is completed in digester (B) the release of the pressure in this digester is carried out in such a manner through the diffuser (C), which is full of soda pulp from the first digester (A) that a steam cushion of a definite pressure remains over the paper stock in the diffuser, by means of which the liquor is forced out of the same for the most part. This is accomplished by the introduction of a reducing valve (4) on the waste gas line (3). In order to increase the effect of blowing off the pulp in the diffuser the liquor space under the diffuser screen is connected with the condenser (D) by the vacuum line (6). A safety overflow device is built into this line which prevents the rise and overflowing of the liquor into the condenser.

Steam enters the digester (A) through the inlet



(1), and the operation of digestion is carried out in such a fashion that when the contents of digester (A) have been blown over into the diffuser (C) through the pipe line (2) the digester (B) is ready to have the pressure released from nine to four atmospheres. The brown liquor which is obtained from the diffuser in the undiluted condition is allowed to flow into the brown liquor storage tank (F) from which it is blown into the evaporators. A pressure pipe system (C′) is built into the pulp space of the diffuser (C). This system is connected with a pressure pump (H). The soda pulp, which is strongly compressed due to the blowing-off of the digester (B) through the diffuser is now loosened by the admission of water under pressure through (C′) and is washed. Fresh water can be introduced through the line (5). The wash waters are collected in the tank (G). Fresh water can also be fed to the pressure pump (H) through the line (14). The wash waters from (G) are used for loosening up the compressed pulp and washing the same in future operations.

If there is sufficient water available the installation of a surface condenser (D) is advisable. The cooling water then enters at (8) and the condensate is removed at (9) and used over again in the process, while the heated water is pumped to the boilers through the line (7). The figure also shows how a spray condenser can be connected into the system.

Pulp from Grass

The Possibilities of Development of the Industry in Assam, India

By E. H. S. BARTER,
Late of Assam, India

RAPIDLY, the world's demand for paper pulp is increasing, and at the same time supplies are not keeping pace. It is an admitted fact that the use of wood for pulping purposes is grossly expensive, replenishments of resources taking from forty to sixty years, and it behooves manufacturers to consider other sources from which satisfactory pulp may be made.

In Assam, there are at the present time, tens of thousands of acres of Savannah grasses, which have been tested and proved admirably suitable for certain classes of pulping. In recent years extensive experiments have been carried out under the supervision of the Government of India, and two qualities of paper have been manufactured from the pulped grass. These two qualities are, one, a paper very similar to Seramopore, as used by the Indian Government departments, prepared from Sabai grass, and, two, an excellent Badami, bazar or packing paper in very great demand throughout India. The particular kinds of Assam grasses from which these two papers can be manufactured are known as Khagra and Batta.

At the present time India is importing annually about 12,000 tons of wood pulp from Europe, thereby naturally reducing by that amount the pulp available for paper manufacture in America and Europe; at the same time the natural resources of India are practically untouched. The present demand for paper pulp in India is rapidly increasing.

As paper pulp can be prepared in Assam and landed in Calcutta, or elsewhere in India where mills are already established, at a considerably lower price than the imported wood pulp, the enormously increased modern freights being eliminated, there is every indication that a ready market exists on the spot for the output of a pulp mill producing at least 10,000 tons annually.

Amongst traders, merchants, and Government circles, there is every confidence that the paper industry of India will expand as the pulping industry shows signs of development.

A year or two ago the writer was in Assam and Bengal, and made extensive enquiries as to the possibilities of the industry itself and as to the markets available, and found that certain of the established paper mills were actually willing to contract to take the whole output of a ten thousand ton pulp mill if one were erected and operated satisfactorily.

Three paper mills, two in Calcutta and one in Lucknow, were interested in the proposition immediately and without further inquiry as to the possibilities of good pulp being manufactured from the Assam grasses, they knowing that there was no shadow of doubt as to the feasibility of the project. They one and all agreed that the world-wide demand for good paper pulp is likely to reduce the amount available for export to India, and that, at a mild estimate, India could and would easily absorb 10,000 tons annually, if not more. These mills had made fairly extensive tests themselves with various fibrous materials, with the object of getting a regular supply of easily bleached pulp, but had given up the idea until pulp manufacturers came along and established mills specifically for that purpose. What is wanted by the paper mills is a pulp which will bleach easily and cheaply, other kinds being plentiful, and in the Assam grasses before mentioned is found the fibre which will answer this purpose. Incidentally, without any bleaching being necessary, there are other grasses which produce very excellent brown paper and cardboards in abundance.

Some interesting high-lights on costs were gathered whilst the writer was in India, and it is not inappropriate to summarise these here. Before the war Calcutta paid for best quality pulp for white papers about seven pounds sterling per ton c. i. f. Calcutta, or roughly $35.00. During the war, the price of the same article went up to £25, or $125, and in 1920 it rose to as much as £53 or $265 per ton. This was not altogether due to world shortage, but was largely attributable to profiteering at different stages of production and transportation. The price is never likely, in the opinion of paper manufacturers in India, to fall to as low as £7 per ton ($35), but is expected to remain at or about £20 ($100) and to stabilize. The manufacturers expressed the strongest opinion that any concern producing an easily bleached pulp to sell at this anticipated stabilized price of £20 or $100 per ton would have a very safe proposition as regards the sales end of their business. As mentioned later in this article, the grass pulp producible in Assam would not only be produced at this figure, but would give a very large profit to the pulping operators.

Some Facts Regarding the Market for Pulp

These facts are naturally given in special relation to the Indian market.

Present consumption of paper and paper goods in India, per annum.....	75,000 tons
Manufactured by local mills.....	30,000 "
Paper imported annually.....	45,000 "

To supply the essentials for the above mentioned 30,000 tons of paper manufactured in India annually, 12,000 tons of pulp has to be imported from the outside world.

The world's demand for Paper annually is at present about 10,000,000 tons, and this is increasing at the rate of roughly 25 per cent every ten years. Incidentally, owing to other demands, the size of wood pulp logs has fallen considerably, whereas formerly the average being 12 inch to 6 inch, they are now as small as 4 inch in diameter. Permanent increases in manufacturing costs, for example labor, machinery and freights, also militate against the Indian paper manufacturers being able to continue importing pulp.

The writer visited several extensive grass bearing districts in Assam, one at Barpeta of over 20,000 acres, another at Borjania of 10,000 acres, and a smaller plot at Harri Chur of over 1,000 acres. The altitude varies, but the height is not great in any case. The land nearer the rivers bears a majority of Khagra grass, whilst that somewhat higher carries mainly Batta grass. Needless to say, these are not the only areas available, but were simply selected as likely ones on account of their proximity to a "ghat" or steamer calling station on the Brahmaputra. These "elephant" grasses can be cut and repeat themselves every three years, so that the natural resources are never exhausted, as in the case of timber lands.

Enquiries were made of local officials and higher Government agents, and it was learned that cutting rights would readily be granted to anyone who had the necessary backing, or who could show that by obtaining a grant or concession he would not tie up the enormous tracts of land to the exclusion of others unless he had a bona fide reason for so doing. Cutting rights would be granted, on a basis where output would be the main factor, as to royalties to the Government.

The output of dry grass per acre is:

Batta 3.5 tons, every year and Khagra 7.8 tons every third year.

When the grass is first cut it is wet and naturally weighs more, the amount from each acre being:

Batta 6.7 tons, and Khagra 19 tons.

Experiments have shown that daily ten men could cut and bundle the grass on one acre of Batta land, and forty men could do the same to one acre of Khagra land, the day consisting of eight hours labor.

The yield of pulp from the dry grass is 38 per cent in the case of Batta and 43 per cent in the case of Khagra, one acre of Batta producing roughly 1.33 ton of pulp annually, and Khagra 3.35 tons. It will, therefore, be seen that, as Khagra land is predominant, it will take approximately 752 acres of Batta land to produce 1,000 tons of pulp, and 2,683 acres of Khagra to produce 9,000 tons, to aggregate the 10,000 tons annually which are necessary to make a successful pulping mill. Experience has shown that at least 90 per cent of the land available is Khagra.

The usual labor difficulties in a country like Assam are eliminated to a great extent owing to the considerable settlements of villagers on the banks of the Monas River, a tributary of the Brahmaputra. These people are very hardworking and are good cultivators; they tend their own crops of rice in March, August and September, and are available from October to January for cutting grass. From local inquiries which were made, it was ascertained that these people were quite willing to work on local contracts for cutting the grasses and bringing them to the mill. There has in recent years been an apparent tendency for more settlers to go to the districts inspected, as the abundance of good rice land is very attractive.

Labor costs are low, and it has been estimated at the spot that the average cost per ton of dry grass landed at a mill would be about seven rupees, or two dollars, this meaning about eighteen rupees a ton of pulp, or, say, six dollars. It is well nigh impossible to give accurate manufacturing cost figures, but experience of the manufacture of Serampore paper from Sabai grass has proved that the total cost of the pulp landed at the paper mill in Calcutta is in the vicinity of one hundred rupees, or at the present rate of exchange, approximately $30.00. Of this figure, it is interesting to note that freight alone is responsible for more than one-half. Comparing this estimated and probable cost of $30.00 per ton with the known wishes of the Calcutta paper trade to acquire pulp at a figure in the neighborhood of $100.00 per ton, it will be very readily understood what the enormous possibilities are for the early development of the pulping industry from grass.

The initial capital expenditure has been estimated to be very high, but a first-class plant should be erected for about half a million dollars, capable of turning out at least 20,000 tons annually. To anyone who has the best interests of the pulp and paper trade at heart and who has sufficient vision, there are prospects in Assam beyond the dreams of avarice.

Average Yields of Groundwood Pulp from Various Woods

Based on data collected at an ordinary commercial grinder by the Forest Products Laboratory, U. S. Forest Service, Madison, Wis.

Species of Wood—	Weight of bone-dry wood per cu. ft., in lbs.	Yield of bone-dry pulp per 100 cu. ft. of solid rossed wood, in lbs.
Birch, white	34.20	2,954
Fir, alpine	22.00	2,068
Fir, balsam	21.50	1,908
Fir, lowland white	21.53	1,950
Fir, noble	21.07	1,920
Fir, red	22.25	1,915

Fir, white	21.40	2,007	Pine, western yellow	24.65	20.61
Gum, black	30.36	2,612	Pine, white	20.25	1,885
Hemlock, eastern	24.60	2,030	Poplar	24.16	2,168
Hemlock, western	24.80	2,160	Spruce, Englemann (Colo.)	21.28	1,965
Pine, jack	24.00	2,126	Spruce, Englemann (Mont.)	24.40	2,250
Pine, loblolly	28.21	2,454	Spruce, Sitka	23.60	2,040
Pine, lodgepole (Cal.)	23.20	1,926	Spruce, white	26.42	2,400
Pine, lodgepole (Mont.)	25.15	2,136	Tamarack	32.00	2,620

Dryer Felts

BY GEORGE F. KENNEDY

IN THE fabrication of dryer felts a good quality of middling cotton is generally used. A good, clean, white cotton with 1⅛ in. staple is preferred, although some mills use a tinged cotton which is sometimes sold as much as five cents a pound lower than the market price. As far as strength is concerned, there isn't much difference, but the resulting dryer felt presents a rather dingy appearance, and the price ordinarily charged is the same as for a good clean cotton fabric. Contrary to the general belief, none of the cotton going into the manufacture of dryer felts is bleached, as bleaching is detrimental to the strength of the fabric, and to give good service a dryer felt must have strength.

Yarns

The yarns are numbered from one up. No. 1 yarn, consisting of 840 yards or one hank of single strand cotton with just enough twist in it to hold it together. One hank of No. 1 yarn weighs one pound. No. 2 yarn consists of 1,620 yards, or two hanks, and weighs ½ pound to the hank, being just one-half as heavy as No. 1 yarn. The yarns follow in the same progression, the number of the yarn corresponding to the number of hanks in it and to the number of hanks to the pound, the higher number the yarn, the finer the cotton.

The Standard Ducks

Canvas is graded on a basis of 36 in. x 22 in., or 792 sq. inches. The standard grades begin with the finest or No. 10 duck, which weighs on this basis 9 oz. Each grade heavier increases by one ounce until the No. 1 grade is reached, and then on through the /0 (naught) duck by the same progressism. Thus 4/0 (four naught) duck on the 36 in. x 22 in. basis is 22 oz. duck and would weigh 36 oz. per sq. yard; 6/0 duck 24 oz. or 39¼ oz. per sq. yd., and 8/0 duck 26 oz. or 42½ oz. per sq. yd. Of the ducks, the 4/0, 6/0 and 8/0 are the grades most used for dryer felts, the 6/0 being the most popular with the general run of mills and 8/0 with the news mills. Very few mills use as light a felt as 4/0. The following is a list of numbered and (naught) ducks with their weights on the 36 in. x 22 in. basis:

No. 10	9 oz.	2/0	20 oz.
No. 9	10 oz.	3/0	21 oz.
No. 8	11 oz.	4/0	22 oz.
No. 7	12 oz.	5/0	23 oz.
No. 6	13 oz.	6/0	24 oz.
No. 5	14 oz.	7/0	25 oz.
No. 4	15 oz.	8/0	26 oz.
No. 3	16 oz.	9/0	27 oz.
No. 2	17 oz.	10/0	28 oz.
No. 1	18 oz.	11/0	29 oz.
1/0	19 oz.	12/0	30 oz.

Construction of 4/0, 6/0 and 8/0 Dryer Felts

Although there are some exceptions to the general rule, the construction of the 4/0 felt is seven strands or 7 ply of No. 7 yarn in the warp and 8 ply of No. 7 yarn in the filler. This felt should show 15 picks to the inch and run 36 oz. to the square yard.

The 6/0 construction is 7 ply of No. 7 yarn in the warp and 11 ply of No. 7 yarn in the filler, 14 picks to the inch, and should weigh 39¼ oz. to the square yard.

The 8/0 felts run 8 ply of No. 7 yarn in the warp and 13 ply of No. 7 yarn in the filler, 12 picks to the inch and weigh 42½ oz. to the square yard.

While both 4/0 and 8/0 are made of No. 7 yarn, still the 8/0 is twisted much heavier than the 4/0, and this together with three less picks makes it very much rougher to the eye in appearance.

Bagging and Wrinkling of Dryer Felts

If a dryer felt is properly made, the filler threads should run at exactly right angles to the warp threads. Sometimes in order to increase production a loom is speeded up with the result that the filler thread is beaten in too hard, and the filler threads in the finished fabric tend to bow or form an arc; this is much more noticeable in the product of light looms than those of heavy construction. After these felts are run on the paper machine a short time the filler threads begin to work back to their proper position, i. e., at right angles to the warp threads, and the felt will begin to bag and run into a wrinkle. The only way to offset this is to be sure that the ends of the felt to be joined are cut to follow a filler thread; this insures the felt running evenly on the machine. Care should be taken never to square up felt ends for splic-

ing, so that you will have to cut through filler threads.

Once a dryer felt bags or wrinkles, it is an impossibility to bring it back into shape again, and the machine crew should not be blamed for something which is the entire fault of the mill making the fabric.

A good single warp dryer felt should stand a pull of 300 lbs. per inch of width and elongate about 15 percent before breaking. Under normal working conditions these felts stretch approximately 2½ percent.

Double Warp Felts

The double warp felts are rapidly replacing the single warp felts (standard duck felts) on modern high-speed paper machines. Although there are still a number of single warp felts used, they are on old machines which are crowded to the limit to maintain a production that will enable their product to be sold in competition with that of the fast machines.

Needless to say that under these conditions with the felts running abnormally wet a double warp felt will rot out almost as quickly as a single warp felt; so it is of no advantage to pay the higher price for the double warp construction.

The double warp felts, under modern conditions, although higher in price, nevertheless show a lower cost per ton of paper dried. They are of heavier construction to withstand the sudden changes in tension on high speed machines, and on account of their double thickness have no tendency to bag or wrinkle. The one warp offsets the other in this respect.

They are generally made of a finer grade of yarn than the single warp felts. They consist of two warps bound together by a binder thread either lighter or of the same weight as the warp and filler threads. A light binder thread gives a finer construction and a heavy binder thread a coarser construction. Their construction is as follows:

13 Pick Double Warp Felt (1)

Warps	5 ply
Binder	3 ply
Filler	5 ply

13 Pick Double Warp Felt (2)

Warps	5 ply
Binder	4 ply
Filler	5 ply

16 Pick Double Warp Felt (3)

Warps	5 ply
Binder	5 ply
Filler	5 ply

17 Pick Double Warp Felt (4)

Warps	4 ply
Binder	4 ply
Filler	4 ply

The 13 pick double warp felt (2) shows a tensile strength of about 525 pounds per inch of width.

The 16 pick double warp felt (3) has a tensile strength of about 595 pounds per inch of width approximately twice as strong as a single warp felt.

A good double warp felt will shrink on an average about 4 to 5 percent across the machine and will elongate about 5 percent under normal working conditions. Double warp felts should be ordered as wide as can be gotten inside the dryer frames. This will allow for shrinkage and will insure the felt running true, as the overlapping edges, shrinking, prevent the felt from running from side to side on the machine. This is a material aid to the guide roll.

English Weave Felts

English weave felts are made in 2, 3, 4, 5 and 6 ply of No. 20 cotton yarn. The warps, binders and fillers are generally made of 4-ply cotton throughout the weaves. They run approximately 22½ oz., 34 oz., 45 oz., 57 oz. and 68 oz., respectively, per square yard and are sold on a square yard basis instead of poundage-width basis.

On account of the fineness of the yarn, the weaving of an English weave felt is a slow process and the looms make on an average about a yard an hour. These felts being of open construction will dry fully 15 percent more paper than the double warp felts with the same consumption of steam. They shrink, however from 7 to 8 percent in width and when run loose stretch about 10 percent—when run tight 12 percent. On high grades of paper with machines running at a low speed these are ideal felts to use but are impractical on high-speed machines.

They are made endless, if so desired, by a patented process. On both ends of the felt for about 4 inches back one-half of the warp threads are left out in the weaving, leaving two flaps which are overlapped and machine sewed together. With fine but strong cotton machine thread, extra crisscross stitching makes a firm, even seam and is strong enough to withstand the tension on the paper machine.

Effect of Aluminum Sulphate (Alum) on Dryer Felts

An acid free alum, in the opinion of the writer, has in itself no detrimental effect on the dryer felts, other than a stiffening of the cotton fibers themselves, and this in itself should not be so marked as to cause any real shortage in the life of the felt. If in the buying of alum the mills would pay a little more attention to the content of **free sulphuric acid**, which is not only detrimental to dryer felts but to wet felts and wires as well, it would be a step in the right direction. A sizing alum should be neutral or slightly basic in reaction.

When your felt is crumbling to pieces don't gather up a few handfuls and send them to the manufacturer, saying that he must have swept up the mill to make your last felt. See if your alum is right and be sure that your machine tenders haven't baked the felt on the hot dryers, not intentionally but while they were busy on a broke order on the first press.

Pulp and Paper Mill Superintendents Hold Annual Convention

IT was altogether fitting that the fifth annual convention of the American Pulp and Paper Mill Superintendents Association should have been held in Springfield, Massachusetts, for at one time that bustling city was the leading paper-making center of the country, and many of our most successful paper makers now scattered throughout the entire Union obtained their first start and received their fundamental training in mills situated along the banks of the famous Connecticut River.

In all respects, the Springfield-Holyoke Convention, which was held in the Hotel Kimball, of Springfield, May 31, June 1 and 2, 1923, was the most successful of any ever held by this Association. Superintendents, machinery and supply men, and a good number of ladies, numbering a total of nearly three hundred, came from all parts of United States, Canada and as far south as Cuba. The weather was ideal to allow the visitors an opportunity to enjoy the splendid hospitality and wonderful program prepared for them by the Entertainment Committee of the Connecticut Valley Division of the Superintendents Association, local manufacturers and the Springfield Chamber of Commerce.

Early on Thursday morning, May 31st, as the visitors arrived in groups from different sections of the country, songs and cheers filled the air, old friends were greeted, new acquaintances made and on every hand was heard the call of "Brother."

Following the registration, the meeting was called to order by President J. H. O'Connell in the main dining room of the Kimball Hotel. A most cordial greeting was extended by John J. White, treasurer and general manager of the Whitmore Manufacturing Co., erstwhile mayor of Holyoke and chairman of the Connecticut Valley Division, in his welcoming address, and mention was made of the fact that special preparations had been made for the entertainment of the ladies. He was followed by Mayor Edwin F. Leonard, of Springfield, who spoke on some of the early history of the Valley and the difficulty in realizing the progress made by the paper industry since a hundred years ago when there was not a railroad or telegraph pole to be seen and it took five days to go from Boston to Springfield.

President O'Connell reported that 112 new members had been taken into the Association since the Kalamazoo Convention and three new divisions formed; namely, the Western Board Division, the Canadian Division and the Connecticut Valley Division. A plea was made for closer cooperation of mill managers and presidents to the extent of seeing that their superintendents became members of the Association, although appreciation was expressed for what efforts had been made and the wonderful growth already exhibited. He then introduced Mr. L. S. McCurdy, of the Papetera Cubana Paper Co., Puentas Grandes, Havana, Cuba, the lone representative from that country; Fred C. Boyce, ex-president of the Association, who said that members of the Wisconsin Division had come down in strong numbers to show the eastern mills how to make paper; and Peter J. Massey, treasurer, who gave a short talk on the importance of the meeting and the value of the subjects on the program to be discussed.

Dr. Baker First Speaker

The first speaker on the program was Dr. Hugh P. Baker, secretary-treasurer of the American Paper and Pulp Association, whose subject was "Relations in the Paper Industry." He said that as the forests are fundamental properties in the making of paper, so are the Superintendents and Technical Associations fundamental to the upbuilding of the paper industry, and they with the Cost and Salesmen's Associations are the four working bodies in the industry, whose chief concern is the problem of making paper cheaper and finding additional uses and broader markets for the product. Better relations between employer and employee can be brought about through acquaintanceships formed in the activities of association work, and the solutions of common problems effected. He said that it will become more necessary as time goes on in order to offset the foreign competition which is a constantly growing menace to the paper manufacturing industry in America, to break down the individual feeling between the different groups and pool their interests by merging into one common industrial group.

Luncheon was served in the Banquet Room of the Hotel, after which the business of the afternoon session took place which consisted of the reading and discussing of four papers. "Boothal Pulp and Water Saver" was the title of a paper read by Mr. L. M. Booth, of Booth Chemical Co. The Boothal pulp saving process consists in the addition to the excess white water of a small amount of this coagulant. The coagulated stock settles promptly to the lower portion of the tank, leaving a practically clear water above. The thickened pulp from the bottom of the tank can be delivered back to the machine and the clear water from the top of the tank can be used for showers or elsewhere as required.

As an aid to settling, Boothal permits the saving of all the stock carried by the excess white water. Usually more than 95 per cent of the coagulated stock settles in the pulp saver tank and returns directly to the system. The other 5 per cent is not lost because it is suspended in the clarified water which is reused and consequently does not find its way out of the mill. Aside from settling the stock so that it can be reused, this process purifies the water as well. The cost of operation is from ½ to one cent per pound of recovered stock.

Mr. Harold Bing, of the Sandusky Foundry and Machine Co., read a paper on Suction Rolls, in which were described the construction, operation and power requirements of the Suction Couch Roll, and Suction Press Rolls for cylinder machines and Fourdrinier paper machines.

In the absence of Mr. R. R. Best, of the Western Paper Makers Chemical Co., his address entitled "Foaming of Paper" was read by E. J. Johnstone, of the Holyoke office of the company. A paper on "Lubrication," prepared by Mr. R. P. Tobin, of the Vacuum Oil Co., was also read. Both of these subjects are popular and they elicited considerable discussion.

Thursday Evening Banquet

The banquet and entertainment on Thursday evening was a stag affair. It was a complimentary one given by the Paper Makers Chemical Co.; Buchanan, Bolt & Co.; Holyoke Bar Co.; B. F. Perkins & Son, Inc.; Casper Ranger Construction Co., and Walsh's Steam Boiler Works—all of Holyoke. In order that the ladies might not feel slighted, they were treated to a clambake at Riverside Park. A special car brought them to the Park in the afternoon and returned with them in the evening. Special credit is due to Mr. C. H. Kent, of the Paper Makers Chemical Supply Co., for the efficient manner in which he attended to all arrangements for the ladies' entertainment.

Relaxation and a high spirit of fun and goodfellowship prevailed throughout the evening's entertainment. Mr. John J. White acted as toastmaster, and he kept the crowd in a state of laughter and enjoyment. Following the community singing and special songs by professional artists, moving pictures were shown through the courtesy of Price Brothers, Ltd., Quebec, Canada, and Mr. Russell McCandless, Riorden Co., Ltd. The film showed the complete manufacturing process of bleached sulphite at the Kipawa plant of the Riorden Co.

A piece of information which created a burst of enthusiasm was a letter read by Toastmaster White from Mr. P. T. Dodge, president of the International Paper Company, stating his regret at not being able to attend the banquet, but expressing his belief and faith in the Superintendents Association, that it is built on sound and logical lines and a great benefit to producer and consumer alike. This was taken as a proof of growing interest on the part of the mill, owners and executives.

New Division Suggested

Suggestion was then offered by Mr. White that a Newsprint Division be formed which was later decided upon in the form of a resolution at the general busines meeting. Mr. Paul E. Bidwell, of B. F. Perkins & Son, Inc., was chosen by the manufacturers of the Connecticut Valley to represent them and voice their cordial welcome, which he did in pleasing terms. President J. H. O'Connell was the object of a fun-making episode, when a tramp (?) forced entrance into the room and accused the popular president of being the cause of his downfall and dereliction. Jack was visibly and perhaps conscientiously disturbed, but was later set at peace when the fellow proved to be a handsome and well-groomed chap with a wonderful ability to tell good stories. Rev. H.

B. Hulbert, F. R. G. S., gave an inspiring and intellectual address on the subject of Foreign Competition, in which he pointed out that China offers us the greatest potential opportunity for export trade. Mr. Hurlbert is familiar with the characteristics of the Mongolian people, having lived among them for many years, and he praises the integrity of the Chinese. He said that we have nothing to fear from the Japanese so long as we maintain our proverbial American courage and aggressiveness. Dr. Baker concluded the speakers' program by announcing the formation of the Forest Industries Club, in the Pershing Square Building, New York City, where its members can meet for luncheon or dinner, and enjoy all the priveleges of such seclusion. Applications are being received for individual and corporate memberships by Mr. L. B. Stewart, secretary, with offices on the floor, who will give all of the particulars upon request.

Sectional Meetings Friday Morning

Friday morning was devoted to Sectional meetings. The Chemical Pulp Superintendents held their meeting under the direction of Chairman B. T. Larrabee, of S. D. Warren & Co., Cumberland, Me. The first paper on the program was by Theodore Safford, of the Racquette River Paper Co., Potsdam, N. Y., entitled "The Variables of Wood Chips." Mr. Safford explained that the average percentage of cost of sulphite pulp attributable to wood seems to run about 60 per cent, and that therefore an avoidable wood loss of one per cent in sawdust means 0.6 per cent avoidable charge for this expensive raw material. Some common causes of lack of uniformity of product from the chipper were given, and methods of reducing sawdust loss.

Mr. O. L. Berger, of G. D. Jenssen Co., read an interesting paper on sulphite mill control. He discussed such control as is now used, or could be used, to assist the superintendent in his daily routine work. He said that much of the technical work carried on in some mills is really scientific research work of no immediate help to the operator while its ultimate value in assisting the industry at large in obtaining information for future use is of great importance.

The papers, one by Sidney D. Wells, of the Forest Products Laboratory, Madison, Wis., entitled "Action of Sulphur in Cooking of Sulphite Pulp from Jack Pine," and the other by Edwin Sutermeister, Chemical Engineer, entitled "Losses in Making Soda Fibre," were read by title as neither of these gentlemen were able to attend.

A sectional meeting of printers and papermakers was also held on Friday morning, under the direction of Mr. Homer Stafford, of Knowlton Brothers, Watertown, N. Y. An interesting discussion on the problems of the printer followed a short talk on the subject by Mr. Chas. B. Porter, City Printing Expert of Springfield, Secretary of Connecticut Valley Club of Printing House Craftsmen and Superintendent of Printing for the Fire and Marine Insurance Co. The matter of shrinkage, stretching and curling of paper was discussed in all of its details. Everyone who was present had something to say about their particular experience in respect to it, and the final conclusion semed to be that the basic cause for all trouble of this kind is humidity, and that perfect results can only be obtained by a printer who intends to use his paper for close register work, when the stock is conditioned before going to press. There is always the acquisition or loss of moisture obtained in the transit of the stock from the time it leaves the paper machine until it reaches its destination before printing.

An interesting trip was made by the ladies on Friday to Mount Tom, Holyoke, Mass. A special trolley car took them from Springfield to the foot of the mountain where they ascended, via the mountain cars. Luncheon was served at the Summit House.

Many Subjects Discussed Friday Afternoon

The afternoon session began with a valuable and instructive paper by Mr. T. B. McBain, of Nekosa-Edwards Paper Co., Port Edwards, Wis., on the subject of "Waste in the paper industry." Mr. McBain gave a brief description of where losses occur in every department of a pulp and paper mill, stating that in his opinion, it is waste today that prohibits many American manufacturers from getting into the export business and doing business with the markets of the world at a profit, instead of at home, alone and at a loss. "One of the worst causes of waste," said Mr. McBain, "is the superintendent who thinks he knows it all, who thinks he is too good to belong to this section of the American Paper and Pulp Association, for the man who thinks he knows it all and cannot learn from his fellow man—his competitor, if you please—is not only going backward, but is at a point where others can learn little from him, except not to do as he does."

Mr. Kenneth T. King, of E. I. Du Pont de Nemours Co., Wilminton, Del., next read a paper on "Coloring of Paper." This treated on the production of dyestuffs, mottling of fibres, differences in color absorption due to variation in cooking methods, foaming, two-sided effect and water conditions. "The Value of the Save-All" was the title of another paper by A. W. Nason, of the Green Bay Foundry and Machine Co., Green Bay, Wis., and "The Beater," by Mr. Herman R. Harrigan, of the American Writing Paper Co., Holyoke, Mass. All four papers were discussed at considerable length.

300 Attend Annual Banquet

About three hundred gentlemen and ladies attended the annual banquet at the Hotel Kimball on Friday night. It was a success from the word go, with Mr. White acting again as toastmaster. Two executives were on the speaker's program, Mr. William F. Whiting, president of the Whiting Paper Co., of Holyoke, and Col. B. A. Franklin, vice-president of the Strathmore Paper Co., also of Holyoke, and it was seen that they thoroughly enjoyed themselves.

Mr. Whiting, who spoke first, said that the American people must cherish the traditions of free speech and action inherited from our forefathers. His speech was very brief but he took occasion to point out that it is costing more every year to run the Government and that statistics which have been compiled show that every working man has to put sixteen per cent of his income into Federal taxes. That means, he said, that a working man must work from January 1 to March 1 before he can take in a cent for himself. His efforts must go to help run the Government.

Col. Franklin talked on Scientific Management. He pointed out that there are four principles or ideas of scientific management. He grouped them as follows:

1. If all the knowledge about the actual work being done were to be collected from the workers it would amount to more than the knowledge of that work collected from the management.

2. Certain workers can perform a piece of work better than others.

3. Given the knowledge of the workers and the selection of men best able to do the work, training must be applied if the best that is in these is brought out.

4. The management does too little work and expects too much of the workers.

Col. Franklin elaborated on the theory a little and then discussed the labor problems. He said that the same problems are confronting employers today that confronted employers 2,500 years ago. The working man wants to be made happy. This desire is apt to turn toward a wish for more money, but he said that statistics show that the paper mill worker of today is getting more money in proportion to the cost of living than ever before in the history of the industry. He declared that the two things that will make a contented workman today are friendliness and fairness. He urged superintendents to be friendly with their men and to instill into their hearts the thought that the management is treating them absolutely fair in every respect.

The entertainment consisted of music by Gatchell's Orchestra; soprano solo by Mrs. Janet Colson Webster, accompanied by Mrs. Edythe Snell Gardner on the piano; accordion and violin duets by Cappucio and Ferrari, and varied entertainment furnished by the Garden City Trio.

Annual Meeting Saturday Morning

The annual meeting took place on Saturday morning in the Grill Room of the Hotel. Rising votes of thanks were accorded Mr. C. H. Kent, Mr. John J. White, all of the officers and members of the Connecticut Valley Division, and the Springfield Chamber of Commerce for the wonderful success of the convention and their bountiful hospitality.

Mr. McBain as chairman of the Resolutions Committee offered a number of resolutions which were passed and are in fact as follows:

1. Vice-presidents increased from three to five. 2. Decision to create a newsprint division, which will include superintendents from forty of the mills controlled by the International Paper Company in New York and New England. A request for admission had previously come from the officials of that company. 3. Next annual meeting will be held in some locality where all of the processes in paper making can be seen in operation. Mr. Stafford, superintendent of Knowlton Brothers Company, Watertown, N. Y., recommended that the Association accept the invitation of the paper manufacturers in the vicinity of Watertown and local Chamber of Commerce to hold their next meeting in Watertown. All processes of paper manufacture except soda pulp are in operation in that

vicinity, and it would not be surprising if the Executive Committee decided to hold next year's convention at that place. 4. A liberal interpretation of the by-laws on the part of each division will be granted in order to permit power plant engineers and other qualified executives to become members of the Superintendents' Association. 5. The Association will recommend to the employers that they pay the dues of their employees in the Association. 6. The Association will recommend to the various divisions that they elect their officers in the month of October of each year, and that the next election be held over until October, 1924. 7. A committee of five will be appointed to co-operate with the Technical Association and the American Paper and Pulp Association to work out standardizing plans. 8. Association is on record to oppose any attempt by the Canadian Government to cut off supplies of raw material to this country, and the various divisions will be instructed to take up the matter with their congressmen, asking them to issue warning that an export tax on coal and certain manufactured articles required by Canada might be imposed, should such an attempt be made. 9. The Association is on record to favor Secretary Hoover's recommendation that storage of coal during the summer and expeditious handling of same during the winter months be encouraged on the part of pulp and paper mills. 10. Suitable resolutions were adopted by rising vote and bowed heads for the death of three members during the past year, as follows: Alexander T. McFarlane, superintendent of the Fibre Division of the Hoberg Paper & Fibre Co., Green Bay, Wis., who died November 26th, 1922; Floyd Alfred Tifft, superintendent of the Deerfield Valley Paper Co., Monroe Bridge, Mass., who died February 2nd, 1923; Edward F. Sheahan, superintendent of the Manistique Pulp and Paper Co., Manistique, Mich., date of death not announced.

Election of Officers

The Financial Committee Report showed a healthy state in that department. The following officers were elected for the ensuing year:

President—Nelson R. Davis, S. D. Warren Co., Cumberland Mills, Maine.

First Vice-Pres.—E. T. A. Coughlin, Allied Paper Mills, Kalamazoo, Mich.

Second Vice-Pres.—Homer Stafford, Knowlton Brothers, Inc., Watertown, New York.

Third Vice-Pres.—B. T. McBain, Nekoosa-Edwards Paper Co., Port Edwards, Wis.

Fourth Vice-Pres.—W. A. Anderson, Kinleith Paper Mills, Ltd., St. Catherines, Ontario.

Fifth Vice-Pres.—Herbert W. Server, Miami Paper Co., West Carrollton, Ohio.

Secretary-Treasurer—Peter J. Massey, Wm. F. Hall Ptg. Co., Chicago, Ill.

The meeting closed with a rising vote of thanks to ex-President John H. O'Connell and all retired to the main dining room for a last get-together luncheon and parting shake.

List of Attendance

Name, Address and Firm

Abbott, Ralph E., 127 Broad St., Boston, Lewis E. Tracy Co.
Adams, R. B., Newton Upper Falls, Mass., Stone & Woodward Co.
Allen, Isaac, Ashuelot, N. H., W. F. Robertson & Co.
Allen, Woodward, 77 Summer St., Boston, Solvay Pucres Company.
Allison, A. J., 2422 N. Salem St., Dayton, O., A. A. Simards & Son.
Argy, Robert E., 1525 Niagara Ave., Niagara Falls, Cliff Paper Co.
Argy, William P., Turners Falls, Mass., Montague Machine Co.
Argy, M. J., Niagara Falls, N. Y., Cliff Paper Co.
Arthur, Malcolm U., 11 E. Alvord St., Springfield, Mass., Appleton Woolen Mills.

Babb, C. A., 58 Washington St., Camden, Me., Knox Woolen Co.
Babbitt, E. C., Union Screen Plate Co., Union Screen Plate Co.
Baker, W. E. Byron, York Haven, Penna., York Haven Paper Co.
Barclay, James P., Holyoke, Mass., Whitmore Mfg. Co.
Baker, Hugh N., 18 E. 41st Street, New York City, American Paper & Pulp Asso.
Bario, Joseph, 18 Florence Ave., Holyoke, Mass., Taylor Logan Co.
Barnett, Andrew F., Oakland Paper Co., A. W. P.
Barstow, F. L., Fichburg, Mass., Faluiah Paper.
Beals, A. L., Newark, Delaware, Curtis & Bros., Inc.
Becker, F. K., South Walpole, Mass., Bird Machine Co.
Benson, Bernard, 30 N. La Salle, Chicago, Williams Gray Co.
Benzing, W. M., Canton, N. C., The Champion Fibre Co.
Berger, O. L., 200 Fifth Ave., New York City, G. D. Jenssen Co.
Bidwell, George L., Riegelsville, Penna., Warren Mfg. Co.
Bidwell, P. W., Holyoke, Mass., B. F. Perkins & Son.
Bing, Harold, Sandusky, Ohio, Sandusky Foundry & Mch. Co.
Bishop, P. M., 102 S. Harrison Ave., Middletown, Ohio, Gardner & Harvey Paper Co.
Bolton, P. S., Foxboro, Mass., Foxboro Co., Inc.
Booth, L. M., Elizabeth, N. J., Booth Chemical Co.
Bowers, J. A., Hammermill Paper Co., Erie, Pa., Hammermill Paper Company.
Boyco, F. C., Brokam, Wisconsin, Wausau Paper Mills Co.
Bridge, A. E., Middletown, Ohio, Shartle Bros. Mch. Co.
Brisbois, N. N., 421 S. Park St., Kalamazoo, Mich., Sutherland Paper Co.
Bronk, A. W., Monroe Bridge, Mass., Deerfield Valley Paper Co.
Brooks, M. V., Miamisburg, Ohio, Miamisburg Paper Co.
Brower, Ogden Jr., 261 Broadway, New York City, Gibbs-Brower Company.
Brown, Wm. E., Woonsocket, R. I., American Wringer Co.
Bryan, Alfred, 518 Dewitt St., Kalamazoo, Mich., Bryant Paper Co.
Brydges, William, Niagara Falls, N. Y., Defiance Paper Co.
Bullard, J. G., 17 Beacon Ave., Holyoke, Mass., Huron Milling Co.
Bunce, W. T., 512 Hospital Trst. Bldg., Providence, R. I., Providence Drysalter Co.
Bush, Ernest W., 32 Washington Ave., Holyoke, Mass., Chemical Paper Mfg. Co.

Carroll, F. J., Simonds Saw & Steel Co., Chicago, Ill.
Caldwell, Alexander, Hinsdale, N. H., Geo. S. Robertson Co.
Caldwell, A. C., Piqua Co., Orr Felt Blanket Co.
Cassidy, Henry C., 10 Cottage Ave., Holyoke, Mass., American Writing Paper Co.
Cassie, A. L., 254 Walnut St., Holyoke, Mass., American Writing Paper Co.
Caton, F. E., 2024 Park Ave., Montreal, Canadian Paperboard Co.
Chalon, O. T., 125 Duane St., New York, Kuttroff Pickhardt & Co.
Champion, Charles, Adams, Mass., Berkshire Hills Paper Co.
Clemetson, H. A., 342 Madison Ave., New York City, Buch, Kiser & Co., Inc.
Cornell, N. J., Herrings, N. Y., St. Regis Paper Co.
Cooney, John P., Ypsilanti, Mich., Peninsular Paper Co.
Cornell, John, New York City, Paper Mill.
Cornell, E. H., Chicago, Ill., Cornell Belting Co.
Crossley, T. L., Gardenvale, Quebec, Pulp & Paper Magazine of Canada.
Curtis, F. A., Washington, D. C., Bureau of Standards.

Dalrymple, William, Windsor, Conn., Rainbow Paper Corp., New York.
Davis, A., Torniskaming, Que., Riordan Company.
Davis, W. T., Jr., Eau Claire, Wis., Dells Paper & Pulp Co.
Denison, V. S., 163 Pineywood Ave., Springfield, Sandusky Foundry & Machine Co.
Denner, T. P., Kalamazoo, Mich., Kalamazoo Paper Co.
Dewey, William F., Housatonic, Mass., S. D. Rising Paper Co.
Dieffenderfer, J. C., Easton, Pa., Paper Makers Chemical Co.
Dillon, F. N., Jr., Fitchburg, Mass., D. M. Dillon Steam Boiler Works.
Docherty, George, Holyoke, Holyoke Wire Cloth Co.
Dodd, C., Quebec, Riordon Paper Co.
Dowd, A. Scott., 356 Monadnock Bldg., Chicago, The Paper Industry.
Driscoll, E. F., Lee, Mass., The Smith Paper Co.
Duff, Thomas, 28 Sidney Ave., Holyoke, Mass., American Writing Paper Co.
Dunbar, Thomas L., 518 Light & Power Bldg., Watertown, N. Y., Stebbins Eng. & Mfg. Co.

Edge, Jacob, Downington, Pa., Downington Mfg. Co.
Ellis, Charles L., Downington, Pa., Downington Mfg. Co.
Ellison, Pau. S., 10 East 39th St., New York City, Paper Trade Journal.
Edmonds, T. L., Brokane, Wisconsin, Wausau Paper Mills Co.

Farnsworth, F. C., Norristown, Pa., Farnsworth Co.
Field, F. E., Hinsdale, N. H., Hinsdale Paper Co.
Flinn, G. R., 30 Berkmann St., Worcester, Mass., Flexible Steel Facing Co., Chicago.
Frazier, E. M., Jersey City, N. J., Voorhees Rubber Mfg. Co.
Fuller, Fred N., Kalamazoo, Mich., Kalamazoo Veg. Parchment.
Fushburn, Victor E., Groocton, N. H., Groocton Paper Co., Inc.

Geraghtry, J. M., Mittineague, Mass., Worthyr Paper Co.
Gibbons, E. W., Box 172, Lee, Mass., Smith Paper Co.
Gilman, E. H., Kalamazoo, Mich., Bryant Paper Co.
Glanville, F. H., 36 Belvedere Ave., Holyoke, Chemical Paper Mfg. Co.
Gordon, G. H., St. Hyacinthe, Que., Penman's Ltd., Montreal.
Guenther, Charles J., Boston, Stickle Steam Specialties Co.
Guiterman, E. W., 113 High St., Boston, National Antine & Chemical Co.
Gunderman, Jos. F., 112 Kearny Ave., N. J., Kearny Wire Works, Kearny.

Huckett, H. H., So. Brower, Me., Eastern Mfg. Co.
Haley, W. S., Lincoln, N. H., Parker Young Co.
Harper, Robert O., Hoosatonic, Mass., B. D. Rising Paper Co.
Harrington, J. S., 125 Terminal Place, Watertown, N. Y., Kamarge Supply Co.
Harvey, Tom, Middletown, Ohio, Gardner-Harvey Co.
Hayden, Chas. E., 45 Kimberly Ave., C. H. Hayden Mill Supply Co.
Hayes, J. H., Waterbury, The Waterbury Felt Co.
Hess, M. G., Manheim, Pa., Manheim Mfg. & Belting Co.
Holbrook, A. H., 33 West 42nd St., N. Y. City, English China Clays Sales Co.
Holdon, Harold, Stoneham, Mass., Vera Chemical Corp.
Holt, Thomas, Potsdam, N. Y., Racouith River Paper Co.
Horter, C. L., Rex Paper Co., Rex Paper Co.
Housley, L. E., 20 Fostwick Ave., Jersey City, N. J., Voorhees Rubber Mfg. Co.
Hullhan, J. W., 501 Fifth Ave., N. Y. City, The Wickes Boiler Co.
Hussey, W. F., Waterville, Maine, Waterville Iron Works.

Jackson, A. B., 80 Boylson St., Boston, Skinner Bros. Mfg. Co.
Jenkins, E. S., Cedar Grove, N. J., M. W. Jenkins Sons.
Jensenine, H. N., 110 E. 42nd St., N. Y. City, Nilsen, Lyon & Co.
Johnstone, H. J., Paper Makers Chem. Co., Holyoke, Paper Makers Chem. Co.

Kelly, Michael, 156 Lincoln St., Holyoke, Mass., Crocker-Mc Elwain Co.
Kelly, R. H., Rothschild, Wis., Marathon Paper Mills Co.
Kennedy, J. J., 15 Vine St., Crocker-McElwain Co.
Kent, Holyoke, Paper Makers Chemical Co.
Keogh, T. H., 59 South Findlay St., Dayton, Ohio, Peerless Paper Co.
Kephard, C. H., York Haven, Penna., York Haven Paper Co.
King, Kenneth T., 1114 Tribune Bldg., Chicago, DuPont Dyestuffs.
King, M. C., Bennington, N. H., Monadnock Paper Mills.
Kinne, Harry C., Watertown, N. Y., The Bagley & Sewall Co.
Kinney, C. E., Wilmington, Del., Hercules Powder Co.
Knight, C. H., Easton, Pa., Paper Makers Chem. Co.
Knight, H. W., 185 Pine St., Holyoke, Mass., Louis Dejonge & Co.
Koeing, Paul, 16 E. 40th St., New York City, Continental Paper & Bag Mill.

Labelle, H. N., 27 Morgan St., Holyoke, Mass., Chemical Paper Mfg. Co.

Lockey, H. N., Housatonic, Mass., B. D. Rising Paper Co.
Ladd, Frank C., 795 Main St., Dalton, Mass., Byron Weston Co.
Landfare, W. J., 440 Appleton St., Holyoke, Mass., Appleton Wire Works, Wis.
Larrabee, B. T., Cumberland Mills, Maine, S. D. Warren & Co.
Lawrence, W. F., Kalamazoo, Mich., West. Paper Makers Chem. Co.
Lippitt, Herbert, 100 E. 42nd St., New York City, International Paper Co.
Livermore, R. B., West Croton, Mass., Hollingsworth & Vose.
Livingstone, W. J., Dexter, N. Y., Dexter Pulp & Paper Co.
Lombard, E. D., Holyoke, Mass., Box 205, Hewitt Rubber Co.
Loughead, J. E., 317 East Main St., Western Paper Mill Sup. Co.
Lowe, Arthur, West Dudley Paper, West Dudley Paper.

McAlpin, C. W., South Bend, La Salle Paper Co.
McBain, B. T., Port Edwards, Wis., Nekoosa-Edwards.
McCandlers, Russell, 522 Fifth Ave., N. Y. City, Riordan Sales Corp., Ltd.
McCauley, Donald, Springfield Union, Springfield Union Reporter.
McClellon, William F., Box 504, Windsor Locks, Conn., American Mfg. Paper Co.
McCorkindale, E. W., Holyoke, Mass., Parsons Paper Co.
McCurdy, L. S., Reel 68 Puentes Grandes, Havanna, Cuba, Papalera Cubana S. A.
McGrath, Louise M., Box 203, Elizabeth, N. J., Booth Chemical Co.
McKay, W. M., Holyoke, Mass., American Writing Paper Co.
MacLaren, M. B., Albany, N. Y., Albany Felt Co.
McLintock, A., 170 West 74th St., New York City, Union Sulphur Co.
McMillen, A. J., 420 E. N. Water St., Chicago, Robert Gair Co.
MacMuller, F. J., Holyoke, Mass., Paper Mkrs. Chem. Co.
McWhite, Edward, Georgetown, Ont., Canada, Provincial Paper Mills.
McVie, Alex, 1414 Portage St., Supply Co.
Marshyll, Peter J., Cumberland Mill, Esino, S. D. Warren & Co.
Madore, J. R., Crocker Div., American Writing Paper Co.
Maguire, Milton J., Albany, N. Y., Empire Size & Chemical Corp.
Mansfield, E. K., New London, Conn., Robert Cair.
Martin, Tho. F., Garfield, N. Y., Hannesby Mfg. Co.
Mason, J. Gilbert, Jr., 110 Wilham St., New York City, The Miner-Edgar Co.
Massey, P. J., 466 Superior St., Chicago, W. F. Hall Co.
Matthews, F. R., Box 6, Burnside, Taylor-Atkins Paper Co.
Mendum, H. W., 104 Riverdale St., W. Springfield, American Writing Paper Co.
Merick, G. W., 88 Nonetuck St., American Writing Paper Co.
Milham, E. G., Kalamazoo, Mich., 504 Clinton St., Bryant Paper Co.
Miller, G. S., Newfane, N. Y., Lockport Felt Co.
Miller, L. H., South Bend, Ind., La Salle Paper Co.
Miller, W. H., Springfield Mass., Cheney Bigelow Wire Works.
Milon, F. J., Mignon, Pa., W. C. Hamilton & Sons.
Montville, D. H., 25 Kensington Ave., Northampton, The Shartle Bros. Mch. Co.
Mooney, F. J., Smith Paper Co., Lee, Mass., Smith Paper Co.
Mooney, C. W., Smith Paper Co., Lee, Mass., Smith Paper Co.
More, G. W., 284 Lafayette St., New York City, Geo. W. Miller & Co., Inc.
Morey, Walter C., 99 Chauncey St., Boston, Morey Paper Mill Sup. Co
Morris, W. P., American Writing Paper Co., American Writing Paper Co.
Murphy, F. S., Appleton, Wis., Lockport Felt Co.
Murray, J. A., Fitchburg, Mass., Wm. A. Nandy & Sons Co.
Murriany, T. H., Shuler & Benninghoben, Hamilton, Ohio, Shuler & Benninghoben.

Nason, N. W., Green Bay, Wis., G. B. Foundry & Mch. Co.
Newman, D. C., Box 1372, Providence, R. I., E. I. Her Punt de Forran Dyestuffs Sales.
Nicely, C. E., South Bend, Ind., La Salle Paper Co.
Noble, C. H., R. D. No. 6, Kalamazoo, A. E. Staley Mfg. Co.
Nolan, Martin, Harrisville, N. Y., Diana Paper Co.
North, N. A., Green Bay, Wis., G. B. Foundry & Mch. Works.

O'Brien, R. O., Eau Claire, Wis., Dells Paper & Pulp Co.
O'Brien, J. J., 127 Federal St., Boston, The Paper Mill.
O'Connell, J. H., Harrisville, N. Y., Diana Paper Co.
Outerson, B. L., Carthage, Ryther & Prunglee.
Outerson, J. W., Modena, Chester Co., Penna., Migargee Paper Mills.
Outerson, Dr. F. S., Modena, Chester Co., Penna., Migargee Paper Mills.

Packard, W. E., Erie, Pa., Hammermill Paper Co.
Paront, Jacob, Kalamazoo, Mich., Western Board & Pa. Co.
Pash, Lyman D., New York City, The Paper Mill.
Paterson, Frank, Buck Dun, Pa., Ajax Paper Co., Inc.
Patrington, Samuel, Greenwich, N. Y., Continental Paper Mfg. Co.
Payne, H. J., 10th Ave., at 36th St., McGraw Hill Co.
Perry, E. L. R., Jr., 86 Albany St., Springfield, Mass., Tide Water Oil Sales Corp.
Pinkham, H. M., Jr., 99 Chauncy St., Boston, Moray Paper Mill Supp. Co.
Pountain, C. K., 628 DeWitt St., Kalamazoo, Mich., Allied Paper Mills.

Ramsey, J. G., Manayunk, Philadelphia, Dill & Collins.
Redmond, Mr., 608 Phelps Ave., Kalamazoo Paper Co.
Regmier, A. E., 88 Pearl St., Boston, J. A. & W. Bird Co.
Regnier, N. E., 88 Pearl St., Boson, J. A. & W. Bird Co.
Regnier, John, 88 Pearl St., Boston, J. A. & W. Bird Co.
Rex, Edward, 7 Corser, Riverside No. 2, A. W. P. Co.
Reynolds, N. W., Passaic, N. J., J. & J. Deck Co., Inc.
Rice H. M., 115 Sterling St., Wilmington, Del., N. I. DuPont DeMors Co.
Rice, J. W., 800 Sherman St., W. C. Stebbins Co.
Riedel, Gus, Kalamazoo, Mich., Riedel.
Robertson, William, Albany, N. Y., Empire Size & Chem. Corp.
Rockwood, H. R., Carthage, N. Y., Champion Paper Co.
Regan, Tom, Fitchburg, Mass., Fitchburg Paper Co.
Rooney, Walter S., Albany, N. Y., Albany Felt Co.
Rooney, Fred J., 326 High St., Lockport, N. Y., Upson Co.
Rowlott, R. S., 167 Sumner Ave., Springfield, Cameron Machine Co., Brooklyn.
Roulette, R. S., 147 Sumner Ave., Springfield, Cameron Machine Co., Brooklyn, N. Y.

Rowan, S. O., 285 Front St., N. Y. City, The Cleveland Stone Co.
Safford, Theodore, Potsdam, N. Y., Racquette River Paper Co.
Salter, James, 31 South Second St., Fulton, N. J., Victoria Paper Mills Co.
Schenck, W. T., Hamilton, Ohio, Black-Clawson Co.
Scott, Norman B., 45 Kimberly Ave., Springfield, Charles E. Hayden Mill Sup. Co.
Server, H. W., West Carrollton, Miami Paper Co.
Slater, J. H., Escanaba, Mich., Escanaba Pulp & Paper Co.
Sligh, E. H., Bartsville, S. C., Southern Novelty Co.
Smith, Jack, Middletown, Ohio, Gardner Harvey Co.
Smith, N. W., East Hyegate, Vt., East Hyegate Paper Co.
Smith, Leonard E., Nekoosa, Wis., Nekoosa-Edwards Paper Co.
Smith, S. W., East Walpole, Mass., Bird & Son.
Snell, Ralph N., Holyoke, Paper Makers Chem. Co.
Spear, A. P., 867 Boylston St., Boston, B. F. Goodrich Rubber Co.
Springfield Daily News, reporter.
Stafford, Homer E., Waterton, N. Y., Knowlton Bros., Inc.
Stewart, C. C., North Wilbraham, Mass., Collins Mfg. Co.
Stott, C. H., P. O. Box 1372, Providence, R. I., DuPont Co.

Taylor, H. S., 48 Wistaria Drive, H. S. Taylor, Dayton, Ohio.
Terry, K. E., Cumberland Mills, Inc., S. D. Warren Co.
Thorpe, N. Y., Woonsocket, R. I., American Wringer Co.
Tifft, Charles A., 15 Beacon Ave., Chemical Paper Mfg. Co.
Towne, P. M., 157 Belmont Ave., Springfield, Lockport Felt Co., Newfane, N. Y.

Ulrich, M. L., Jenkins Paper Mills, Inc., Jenkins Paper Mills, Inc.

Vanderbery, A. M., 232 Jackson Blvd., Elkhart, Ind., Lincoln Paper Mills.

Wainwright, R. J., 15 Moore St., New York City, Robert Dollar Co.
Wall, J. J., Milwaukee, Wis., Gen. Electric Co.
Ware, C. J., Holyoke, Mass., Holyoke Bar Co.
Watts, R. W., 417 Liberty St., Cheney Bigelow Wire Works.
Week, C. E. Hinsdale, N. H., Fisk Paper Co.
Weeks, Wallace M., Skaneateles, N. Y., Oswego Falls, Corp.
Weston, Washburn, 137 Furman St., Syracuse, N. Y., American Wringer Co.
Whalen, Maurice, 25 Clarmont Ave., Holyoke, American Writing Paper Co.
White, Jack, Holyoke, Mass., Whitmore Mfg. Co.
Whitney, J. S., 4 Chestnut St., Windsor Locks, Conn., Windsor Locks Paper Mills.
Wilcox, A. F. 440 West Washington St., Chicago, United States Rubber Co.
Williams, C. K., Easton, Pa., Paper Makers Chem. Co.
Williams, Wm. F., 30 Church St., New York, Taylor-Wharton Iron & Steel Co.
Williams, F. W., N. Y. Telephone Bldg., Watertown, N. Y., Williams Apparatus Co.
Wilson, John, Kearny, N. J., Kearny Wire Works.
Wood, Forbes, 725 Laurel Ave., Bridgeport, Conn., Tait & Sons Paper Co.
Woodin, K. B., Housatonic, Mass., B. D. Rising Paper Co.
Worth, Arthur J., Castledorn-on-Hudson, New York, Fort Orange Paper Co.
Wright, James, 44 Laure St., Newton Paper Co., Holyoke.
Wyman, Donald, Fitchburg, Mass., Donald Wyman.

Yates, C. C., Lee, Mass., The Eaton-Dikeman Co.
Yates, O. V., Bridgeport, Pa., Diamond State Fibre Co.

Losses in Making Soda Fiber*

BY E. SUTERMEISTER
Chief Chemist, S. D. Warren Co.

WHEN I was asked to prepare a paper on the losses in making soda fibre to be presented at this meeting my first thought was that about everything had been said on the subject. On further consideration, however, it seemed that there were certain features which are worth a little further discussion. There are a number of places in the process where losses, in the sense that materials are actually thrown away, do not occur, yet conditions are such that later on in the process, loss of product or of material is caused. In my enumeration of losses I have endeavored to take this broad view of the subject with the idea of exciting a discussion.

Any departure from a uniform supply of sound, peeled wood means a loss. If bark has to be removed after the wood reaches the mill, some wood is pretty sure to be lost with it. Rotten wood is partially removed by the screens because it breaks up rather finely, but what reaches the digester gives a lower yield of poor quality fibre, uses up more than its fair proportion of caustic soda, and reduces the output of the digester by occupying space which should contain sound wood.

The so-called sawdust removed by the screen is a total loss so far as fibre making is concerned though it has a certain value as fuel. Its amount should be reduced as much as possible by careful attention to the sharpness of the knives, their setting in the disc and the speed of the chipper. These same factors influence the uniformity of the chips, and uniform chips can be cooked more satisfactorily and economically than those which are variable in size.

If woods of different qualities are used in the same charge a loss of yield will result because the cooking conditions have to be arranged for the wood most difficult to cook and the more easily reduced varieties are overcooked with a consequent loss of fibre.

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*Paper read before the Holyoke-Springfield Convention of the American Pulp and Paper Mill Superintendents Association, at Hotel Kimbal, Springfield, Mass.

Heat Losses

Heat losses, either in the form of steam or fuel, may occur at numerous points. If the digester is not covered with some insulating material the loss by radiation may amount to as much as 1.1 million B. T. U. per hour. Translated into terms of the coal pile this means about 750 lbs. of coal for a 15-cord digester cooked for 5 hours at full pressure. A good insulating covering would save 85-90% of this loss. If the circulating pipe is outside of the digester and uncovered this gives another radiation loss and also lowers the temperature of the liquor delivered to the top of the digester and hence its cooking efficiency. Both of these radiation losses result in greater condensation in the digester and greater dilution of the back liquor going to the vaporator. This means a greater heat consumption in the recovery plant than would otherwise be necessary.

The most obvious loss of steam is that when the digester is blown. It has been estimated that on discharging a 15-cord digester about 34,000 lbs. of steam escape to the atmosphere within 15 minutes. The cost of an exchange heater to handle this has hitherto been considered prohibitive but it would seem that there are possibilities in condensing it by means of a spray and recovering the heat in the form of hot water for washing purposes.

Fuel losses may readily occur in the firing of the recovery furnaces and in the operation of the boilers in conjunction with them. Since there is more than enough fuel value in the black liquor to support its own combustion it may be claimed that all extraneous fuel used is a waste. So far as is known the Moore explosion process for soda recovery has solved this problem and not only recovers soda without fuel but nets a considerable boiler horse power besides.

Soda

This is the material upon which most effort has been expended when it comes to a question of reducing losses.

The loss in the lime sludge from the causticizing room varies with the type of equipment used and the care with which it is operated. With settling tanks it should not exceed 2% of soda ash based on the dry weight of the sludge. It is possible to lower this figure by careful working, but if operations are carried on in a slipshod manner it is likely to be much greater than 2%. There have recently been proposed a number of processes for handling lime mud either by filters or continuous decantation each of which is claimed to reduce the soda loss, but comparisons are difficult to make and no very conclusive figures are available.

The soda lost in the black ash waste after leaching must also be watched carefully. With good work it is possible to hold it below 2% of the dry weight of the waste, but it frequently runs much higher than that. It would seem as though a wet crushing or grinding of the black ash followed by leaching and washing on a rotary filter offer chances of better recovery.

In burning black ash there is a loss of soda up the flues, which, according to Spence, may amount to 2,500-4,000 lbs. in 24 hours for 30-ft. rotaries. So far there is apparently no satisfactory means of recovering this soda at a reasonable expense.

The washing of the black stock offers excellent opportunities for losing soda. Below a certain strength it does not pay to evaporate the black liquor and the final washings go to waste. Unless constant care is used at this point more soda will be thrown away than is warranted by good practice. A study of the losses in washing indicates that not over 1.5% of the total soda added to the digester should be permitted to go to waste at this point.

Even with good washing there is still a small amount of soda left in the fibre. This laso is considered a loss, for even if it could be removed without excessive washing it would still be too dilute to recover. This loss will be about 1.5% of the total soda going to the digester.

Another loss of soda which is not often recognized is that occasioned by the low causticity of the cooking liquor. All soda ash present is valueless so far as cooking is concerned but is subject to the usual loss of about 10 to 20% in each passage through the system. Not only that, but it means just so much more inert material which must be handled by the evaporators, burners, etc. It has been estimated that in a plant making 100 tons of fibre per day each increase of 1% in causticity means an annual saving of about $700.

The final source of soda loss is in leaky pipes, pumps and tanks. The latter especially are often placed where they cannot be readily inspected and considerable losses may easily occur before leaks are detected. If possible all tanks should be placed where they are easily accessible and where leaks will show promptly.

Lime

The only place where lime may be lost is in the causticizing room. Since the causticizing reaction is a reversible one it is customary to add an excess of lime to the first boil in order to get high causticity in the liquor. If the excess of lime is not used up in subsequent boils an appreciable loss may result. This is hard to control because of the variable quality of the lime used, variations in the strength of the leach liquor to be causticized and the rather slow and complicated analysis which must be made before the excess of lime can be determined. It is generally a question of balancing the loss of lime against a possible loss of soda and low causticity if the attempt is made to utilize the lime more fully. In operations which were considered satisfactory the utilization of the lime has ranged from 98.7 to 95.3%.

The lime mud produced in the causticizing room is generally a dead loss and sometimes worse than that if expense is incurred in its disposal. Recovery by reburning may prove economical in some places, but this depends on so many local conditions that no general statement can be made. It is sometimes possible to work up a small local sale of lime mud for use in sweetening farm soil.

Fibre

The obvious place where fibre is likely to be lost is through the wash pit bottoms into the black liquor and with the final washings which go to waste. It would seem to be a fairly easy task to design a screen which would recover the greater part of this. This would not only save fibre but it would aid in keeping the evaporators clean.

Small losses of fibre also occur with the screenings, in the thickener following the sand settler, and in the bleaching system.

A very serious loss is that of the cellulose itself during cooking. Poplar wood contains about 60-62% cellulose by weight yet commercial yields seldom exceed 45%, the balance being dissolved in the cooking process in order to get fibre of the desired character. Frequent attemps are made to devise modified cooking processes which will save part of this loss, but so far little progress has been made along lines which are commercially practicable.

A loss which is sometimes not given sufficient consideration is that caused by dirt in the fibre. Where this is bad enough to cause a decrease in the price obtainable this trouble is pretty sure to get the attention it deserves.

Time

Losses of time in the soda mill may be caused by cooking longer than there is any need of in the attempt to play it safe, or to poor circulation in the digester which necessitates extra cooking. Operations are sometimes delayed by lack of wash pit capacity, due to faulty design of the plant, or by inability to get the fibre washed in the time available because of lack of hot water.

Miscellaneous

Slight losses of materials such as wood alcohol and other volatile organic compounds occur in the relieved gases and steam from the digesters. With hard woods it has never proved a paying proposition to collect these materials, but where resinous woods are cooked, turpentine is sometimes collected as a by-product.

By far the greatest loss is in the potential values in the black liquor. This offers great opportunities along the lines of the preparation of useful products, but the problems involved are very difficult and complicated and little progress has been made up to the present time.

Coloring of Paper*

BY KENNETH T. KING

E. I. Dupont de Nemours & Co.

ON June 3, 1921, it was my pleasure to present a paper before this association entitled, "Dyestuffs and Their Relation to the Paper Industry." In that paper, which was published in the 1922 Convention Proceedings Bulletin, of the American Pulp and Paper Mill Superintendents' Association, the following points were briefly discussed:—the development of the American dyestuff industry; an outline of manufacture of aniline dyestuffs from coal tar; methods of standardization; and a general discussion of the selection and use of

*Paper read before the Holyoke-Springfield Convention of the American Pulp and Paper Mill Superintendents' Association, at Hotel Kimbal, Springfield, Mass.

various dyestuffs with respect to the furnish in which they were to be used.

Production of American Dyestuffs

At that time the production of American dyestuffs was adequate to meet the demand of the manufacturer with the exception of a few specialties which were used in small amounts where certain fastness properties were desired. Very rapid strides have been made by the American dyestuffs manufacturer during the past two years with the result that the paper manufacturer has at his disposal today practically every dyestuff he has ever used in the past, and in addition certain valuable new products which have been the recent development of American chemical research. The French occupation of the Rhur has seriously crippled the German dyestuff industry, but that situation will not be felt by the paper manufacturer as it was during the years 1914-1917. Instead of depending on imports for its consumption of dyestuffs, the United States is now an exporter.

In a paper of this kind it is my opinion that all of us obtain more information in the discussion which follows its reading than through the material it contains. With that idea in mind, instead of a general description of the methods of application of dyestuffs on paper, a few of the special problems which confront a majority of the mills will be briefly related in hopes that in the discussion which follows this reading ideas for the solving of these problems may be forthcoming. The following special problems will be mentioned in this paper: (1) The prevention of mottled fibres. (2) Differences in color absorption in kraft and sulphite pulps due to variation in cooking methods. (3) Foaming. (4) Two-sided effect. (5) Water conditions.

Mottling of Fibres

Mottling of fibres in paper dyeing can be prevented by following a few simple rules. This mottling is caused by one of two things. Either a dyestuff is added in too hot a solution to a single stock furnish or a hot or cold solution is added in the wrong manner to a mixed furnish, where one stock in the furnish has a much greater affinity for the dyestuff in question than the others. The first cause can be very simply remedied by merely adding the dyestuff in cold dilute solution. The second cause usually occurs on a mixed ground wood and sulphite furnish with basic dyestuffs or on a mixed rag and bleached sulphite furnish with direct dyestuffs. In the first case the unbleached sulphite has a much greater affinity for the basic dyestuffs than the ground wood. Hence the dyestuff should be added to the ground wood followed by color and after they have become thoroughly mixed, the unbleached sulphite should be added. Where clay is used on a ground wood unbleached sulphite furnish, the dyestuff can be added to the clay, which in turn can be added to the ground wood unbleached sulphite furnish, without causing any mottling.

On a bleached sulphite rag stock furnish an ideal condition would be to first furnish the beater with bleached sulphite and color it before any of the rag stock is added. However, on account of the nature of the fibres it is necessary to beat the rag stock longer than the bleached sulphite and hence the latter is always furnished last. Therefore, in using direct dyestuffs on such a mixed furnish the dyestuff must be added in a very dilute and cold solution. If mottling is not prevented by care in regard to dilution and temperature on such a furnish, then it is sometimes recommended to add the dyestuff in dry condition to the water in the beater when it is first furnished. By so doing the dyestuff going into solution slowly in the cold water does not have the opportunity of attacking any small group of fibres.

Differences in Color Absorption Due to Variation in Cooking Methods

It is very hard to obtain two consecutive cooks in kraft or sulphite mills which have the same affinity for a given dyestuff. Experiments were recently conducted in our laboratory on nine different kraft pulps from six different sulphate mills, all of which were colored with the same quantity of dyestuff under the same conditions. The shades obtained varied in each case, while as far as the depth of shade was concerned,—in one case the shade was practically double that of another. The sulphite pulps, using a given quantity of a certain dyestuff, the shade obtained with a slow cook or mitscherlich pulp would be much heavier than that obtained on a swift cooked pulp. This question is brought up for two reasons. First, it should prove conclusively to the dyestuff manufacturer and consumer that dyestuffs must become standardized to the highest possible degree so that the superintendents will not have to contend with the additional variable due to uncertain shade and strength of the dyestuff he may be using. The second reason is that it is my firm belief that certain methods will be worked out within the near future for the use of dyestuffs in controlling the cooking processes of sulphate and sulphite pulps with the idea of obtaining more uniform grades of pulps.

Foaming

Every mill, at one time or another, has to face the trouble caused by foaming. While acid dyestuffs give practically no trouble with regard to mottled fibres, they are the worst offenders with respect to foaming. Foaming usually caused by either poorly washed stocks, too slight an acid reaction to the furnish or to the nature of the dyestuff used, which may have the property of having a very high surface tension to its solution. In the case of a poorly washed stock or a slight alkalinity to the beater, an increase in the amount of alum used will usually do away with all trouble. Where the foaming is caused by the dyestuff, the surface tension of the solution can usually be reduced by the addition of such foam killers as sulphonated castor oil, commonly known as Turkey Red Oil, or a mixture of raw linseed oil and ammonia. Kerosene is also used, but is not as efficient as the other two mentioned, as well as causing a certain amount of trouble in gumming up on the rolls in case excessive amounts were used. There is a very true saying, that an ounce of prevention is worth a pound of cure, and with that idea in mind the research department of the company that I represent have attempted to discover what causes such foaming, due to processes in the dyestuff manufacture. So far they have been successful in developing a few new products which for a given shade and strength of an individual dyestuff give practically no trouble with foam, where in the past they have been the worst offenders. The most successful work along this line has been the development of a non-foaming and practically non-bleaching Crocein Scarlet. It is hoped that our work along this line will help to minimize the foam trouble with which paper makers are sometimes confronted.

Two-Sided Effect

The greatest coloring problem facing the paper manufacturer today is the question of two-sided effect. The great increase in production which has taken place in the paper industry in the past few years, due to the increase in speed of machines, introduction of suction rolls, etc., have all tended to cause trouble from the standpoint of obtaining a uniform shade on both sides of the paper. The degree of two-sidedness is directly dependent on the amount of water taken from the paper while it is going over the wire. When direct dyestuffs are used on bleached sulphite or rag furnishes, the amount of two-sidedness depends on two factors,—first, the affinity of the dyestuff for the fibre in question and secondly, the amount of short fibres which are pulled out from the bottom of the sheet by the suction roll or suction boxes. When acid dyestuffs are used on a very wet stock, the two-sided effect is always greater because of the withdrawing of more of the size and alum from the underside of the sheet, the size and alum having the property of forming lakes to a certain extent with the acid dyestuff. To decrease two-sidedness the following points must be kept in mind: A dyestuff should be used which has the greater affinity for the stock in question. Second, the stock should be beaten as free as possible, and third, dyestuffs should be used which are not combined chemically with the sizing materials used in the paper.

Water Conditions

A problem often brought to the attention of our technical department at this time of the year is that of increasing the brightness of white papers at periods of the year when water conditions are at their worst. On the cheaper grades of paper, where basic dyestuffs are used for tinting purposes, this is a comparatively simple matter, for minute quantities of Rhodamine have the property of counteracting the dulling shade in water produced by seepage through the woods in the spring of the year. On the higher grades paper, there is no dyestuffs of exactly the same peculiar cast of Rhodamine which will assist in obtaining a brighter shade for such grades. In such a case Rhodamine would not ordinarily be used, because of it being quite fugitive to light, but where such a trouble, due to water is only temporary, it is usually the best plan to obtain the correct shade at a slight sacrifice to fastness properties.

The work of the Dyestuff Committee of the American Pulp and Paper Association, during the past year, has been confined mainly to the completion of the chapter on coloring of paper for the vocational educational text books, together with a compilation into a table of the reaction of the largely used dyestuffs against all materials used in paper manufacture. During the coming year, this committee hopes to take up special problems and I know it would appreciate the consensus of opinion of this meeting as to what are the most important problems in connection with this work.

The Variables of Wood Chips*

BY THEODORE SAFFORD

Racquette River Paper Co.

IN ANY consideration of the problems of preparing chips for chemical pulp manufacture our motives are conspicuously the same as in all process investigation. We all bend our efforts to obtain the highest possible quality at the lowest possible manufacturing cost.

Everyone familiar with wood room operation knows that the quality of product in an otherwise well planned, well installed and carefully operated sulphite mill may suffer serious impairment from a lack of knowledge of the factors influencing the production, and inattention to closely drawn standards of chip size and cleanliness.

The average percentage of cost of sulphite pulp attributable to wood seems to run about 60%. It may be readily seen that an avoidable wood loss of 1% in sawdust means 0.6% avoidable charge for this expensive raw material. Figure that out on your annual tonnage cost and one sees how profitable attention to the wood preparing department may be.

The Chipper

Just when do these losses in quality and cost crop out and where can they be avoided? The vital tool of chip production is, without question, the chipper. There is one and only one place to make good chips and that is in the chipper; beyond that the opportunity is lost and any effort to reduce the oversize chips or spawls results solely in getting them out of sight and into toothpicks and sawdust.

Some common causes of lack of uniformity of product from the chipper are:

1. Worn condition of disc.
2. Face plates which are intended to prevent wear of disc just ahead of knife need renewing.
3. Knives not set to proper gage as regards outward set of cutting edge from disc.
4. Careless placing of shims after poor knife grinding so that cutting edge thruout its length is not at 90 degrees with the axis of rotation of disc.
5. Lack of adjustment of end thrust bearings to run disc as close to bed knife as safety will permit.
6. Bed knife slipping away from disc due to spout base on which it rests being worn out of plane.
7. Intermittent feeding of wood, spout not kept full, allowing ticks to jump badly, causing abnormal sawdust production and spawls when short ends are turned over by revolving knives and cut with the grain.
8. Dull knives.

The angle at which the chipper knives are ground should be determined largely by the condition of the wood, i. e., wet, dry or frozen. The writer's observations on river spruce of about 42% moisture indicate that a double bevel knife of about 42 degrees and 20 degrees makes a minimum of sawdust having a tendency to "draw" the wood with less jumping and retains its cutting edge for the longest service. Knives ground slightly concave are said to reduce power consumption and make little sawdust but have the disadvantage of losing their cutting edge rapidly. The speed of disc is another factor which may have considerable bearing on the sawdust loss. Scandinavian practice seems to tend almost entirely to speeds of less than 200 R. P. M. many mills running as slow as 160 R. P. M. This question is, however, settled in many American mills by the fact that the demand for chips taxes the capacity of chipper installation at speeds of 275 to 350 R. P. M. As an illustration of what careful attention to the points mentioned will do is indicated in Tables 1 and 2, being tests on chips just as they are discharged from beneath the chipper.

		Table 1	2	3
		% by weight		
Retained on	1.050 square mesh.....	44.7	53.4	15.8
	0.752 square mesh.....	22.9	24.9	39.4
	0.525 square mesh.....	17.9	12.6	33.5
	0.263 square mesh.....	10.7	7.0	9.5
Through	0.263 square mesh.....	3.8	1.9	1.8

As will be noted the percentage of the two larger sizes is quite high, this being because the product contained many "cards" or unbroken bundles of the proper length to make perfect chips. This separation is often accomplished by running all the product of the chipper direct to a crusher. However, with a high speed revolving crusher of well known make, this practice was found to increase the portion under ¼" consisting of sawdust and toothpicks to an alarming extent and also in reducing the cards, not to add materially to the percentage of chips of desired size. In order to take the chips directly to a screen which would select the acceptable chips and remove the sawdust, it was found necessary to open up the cards, this being done by a revolving chip breaker attached to the chipper, which reduced a large percentage of the cards without increasing the sawdust content as shown in Table 3.

The oversize chips may then be passed through the crusher and screened either by again passing them over the first screen or, should its capacity be limited, by use of a second screen, whereby chips may be put to the chip bins with little or no sawdust and of proper size for uniform cooking operations.

Conservation of Pulpwood

Gentlemen, it behooves us to look carefully after this too often neglected department of our mills. Inattention to its details can cost quite as much and more than an extra 50 lbs. of sulphur per ton. A well known authority on pulp mill operation only recently voiced the opinion that the wood room in many mills was treated like the proverbial stepchild. It cannot continue for long to be "anyways to keep the digesters supplied with chips and let the boiler house consume the waste and blind us to its existence." Wood is constantly becoming scarcer and of increasing value. Canada, with its great forests, is being most thoroughly canvassed with a propaganda calculated to bring about the prohibition of exportation of pulpwood even from fee lands. Our national government is busily formulating a comprehensive forestry conservation program. Let us do our part to make every stick entering our mills yield the utmost in finished product while we still have wood in plentiful supply. Your principals, your employers, view this situation with growing concern, but it is up to you superintendents to give this work the attention it deserves. Yours is the final responsibility in this phase of conservation.

Waste in the Pulp and Paper Industry*

BY B. T. McBAIN

Nekoosa Edwards Paper Co.

TIME is the stuff that life is made of. Don't waste it. If you have a minute's time to spare, use it to improve yourself; prepare yourself to fill the shoes of your superior officer next above and prepare your assistant to relieve you of the burdens of your present position.

My subject touches upon one of the most vital diseases of the pulp and paper industry today; yes, of every industry in America, of everything American, as I see it, and by this I mean the United States and Canada. We have had so many years of plenty that we have become careless, yes, even to the last degree. I think we waste enough of everything each year in the pulp and paper industry alone in America to run a 200-ton mill full product, for many years. By we, I mean all of us, you and you and you and myself.

During the World War, which seems yet to be bothering some of our allies, we in America became careless, extravagant and wasteful. We made large sums of money; the returns to the manufacturer were large; the profits great. We could have everything and anything we wanted. If what we had didn't suit, we charged it off, threw it away and bought another. Everyone seemed to forget there was to be another day; tomorrow was not thought of; we all lived for the present, like the gnat which is born but today, yet today must die. Over night, the change came. We hardly knew how to meet the situation; we had dollar ideas and penny incomes. We had driven to our work in high powered cars, if we worked at all; we had been used to two men for every job. The new situation was not understandable; surely it wouldn't—couldn't last long. Some woke up early, wrote off their losses and started anew; others thought to beat the new conditions; but that couldn't be done.

Profit Must Come from Waste

Today many of us are still hoping against hope that the price of paper will go up enough to allow us to show a decent profit. Gentlemen, the sooner we put that idea behind us, the better. What we must do is, get busy, use all the authority we have and even exceed that authority to stop present and prevent future waste. It is everywhere—in some form—waste in wood, in raw material, in finished product, in sales. Waste.

To waste, in my opinion, is worse than to steal. That is a hard thing to say, because all of us are in the waste column. If we are, and are not making every effort to prevent waste, we are doing worse than stealing what we are wasting. Why? If stolen, usually someone gets some good out of the stolen article. If wasted, no one does. Stealing can be stopped; so can waste. The law prevents stealing. The law should be as

*Papers read before the Holyoke-Springfield Convention of the American Pulp and Paper Mill Superintendents' Association, at Hotel Kimbal, Springfield, Mass., June 1.

strong against waste and should be enforced. There is no law, however; common sense should make us all stop it. It is waste today that prevents many American manufacturers from showing in the profit column instead of in red. It is waste today in my opinion, that prohibits many American manufacturers from getting into the export business and doing business with the markets of the world at a profit, instead of at home, alone and at a loss.

I have been preaching this anti-waste doctrine for many years. In one large mill, the campaign we started, netted 20% greater production and a very material reduction in cost. In others, while the returns were not so great, the increase by savings alone put the business on the right side of the ledger.

There are many mills today, mill officers, mill managers, mill superintendents, who will sit back and say, "That don't mean me, I am not guilty,"—yet when you go into their mills, you will find stock wasting into the river, waste in power, waste in steam, waste in coal, waste in everything, but particularly waste in labor. Time.

We all have specialists in our mills in our particular line of manufacture; but few of us have specialists in the saving of waste. Most of our mills employ cost accountants, and rightly so, who put in expensive systems to watch the disbursement of nails and like material from the mill store, the amount of paint or aniline delivered to the mills and the woolen felts, wires and jackets delivered to the machines; but the value of these same articles is being wasted many times each day in other ways, without any way of checking them. What the boss doesn't know, doesn't hurt him and nothing is being done to prevent this loss—waste.

I can start from the wood lot and follow the wood to the mill, through the various processes to the car and even to its final use in the plant of the consumer, whoever he may be and show you waste; yes, waste to the point of making you disgusted with such an industry if you didn't have the right and authority to stop it. Go home, gentlemen, for a few moments. Your minds are now on your daily work. Follow me through your plant, please:

The Wood Pile

The wood in the pile—see that rotten log? That tree should never have been felled; but if down before its value was determined, it should not have been shipped. Waste of labor in cutting and loading, waste of freight in delivery, waste of labor in unloading, and worse than anything else, rot and worms go together, your log pile is endangered by contact with it. There are many such logs; great is the waste.

Method of handling wood from pile to mill makes it necessary to deliver these logs when their turn comes, more waste of labor, the quality of your product is endangered. An error happens, some of it gets into the chip bin or goes to the grinder room. It is not even good fuel, you get no product from it, waste of all equipment and labor in the handling ensues; but you do get dirt and in the case of groundwood, you get infection which shows up in the pile of stored laps and then again there is waste.

Power Machinery

See the engine running that wood room; the exhaust steam can be used; but it is going to waste. Another wood room is operated by direct connected water wheel installed thirty years ago, probably never cleaned since installed and wasting over half the water going through the flume while the number of gears and belts in use show another waste of 25% to 50% of the power the wheel does produce.

If an old, out of date water wheel must be used, it will pay to get a small sand blast and give it a thorough cleaning inside, at least once a year. The waste in most plants on this account is great, many times almost 50% of the possible power. But if you do clean them, know that they are cleaned inside, don't take someone's say for it.

The Boiler Plant

Look at the steam pressure—some mills are still using boilers that are little better than junk. Steam driven pumps, hand firing of coal, poor handling of hog, improperly designed furnaces, poor draft, lack of meters on water and steam, improper control of air, etc., are all points to show whether the efficiency possible in the boiler room is at a point where there is sure to be waste. Coal costs for power and heating are putting many mills to the bad.

Fire System

Are you using the steam fire pumps for general service and work, where an up to date centrifugal or plunger high efficiency pump would pump twice the water for half the cost? Is your fire pump of any value for emergency use in case of fire if it is being so used?

Labor

Follow the wood to car or to the pulp mill grinders or chippers and check up on each man. In most plants 10% of the labor is waste; in some, considerably more.

Fibre Mills

Because of the length of fibre, the loss is not so great as in groundwood plants; but there is waste from chippers, poorly made chips, chip screens, blow pits, screens, deckers, wet machines, liquor waste in making, steam waste in cooking, liquor waste in reclaiming and recovery, chemical waste in possible by-products, sludge waste in soda and sulphate. Some soda mills are saving 85% of their original lime by recalcining their sludge. Laws prevent the discharge of sludge and other mill waste into streams. Thank the law.

Pulp Grinders

Check up the power used per ton of pulp on the grinders. Some mills are wasting from 10% to 40% of the power on the grinders because of improper or insufficient use of burs, poor supervision by foremen; not running the stock at proper temperature, poor speed control, and various other reasons.

Pumping Equipment

Follow the pulp from grinder pits to screens. Very poorly designed, out of date pumps are wasting 25 to 50% of the power used, either because of over speed or of improper type for the service.

Screens

The screens, in many mills, are discharging or rejecting good fibre because of the speed of screens or improper consistency of the stock, waste of power and fibre, as well as labor and equipment producing the wood and pulp up to the screens.

Thickeners

The deckers are leaky and are passing good stock around the ends of cylinders, due to poor packing and poor maintenance. "But that isn't being wasted," I hear some say. "Because we use all our white water"; but in following up all avenues of waste of white water, a large stream sometimes as rich as four pounds per 1,000 gallons, is found wasting into the sewer or river; four pounds in 1,000 gallons is 10% of the original consistency of the stock at the screens, or going to the deckers, and what is commonly called ½% consistency.

Screening of Value

The tailings rejected in most groundwood mills are considered of little value. Some are saved and sold in good times; but in poor times, wasted. These contain some of the best fibre of the log. In grinding wood, two distinctly different fibres are encountered; the hard, annular rings and that soft, punky intercellular material between these rings. In my opinion, two distinct and different processes are necessary to properly handle these two kinds of fibre; that which the screens reject must be handled by a refiner, many good types of which are on the market and are in use in some mills, making marketable No. 1 pulp out of this waste. Again, the pump from decker chest, the agitator, the belts and gears in use, are all wasting power for one reason or another.

Beaters

The beater line is not run up to speed on account of overload, or low voltage, or dirty runners in water wheel, for one of many other causes and the beaters are operated 10% or more slower than they should be and the beater rolls have not been ground perfect and true; waste of capacity, beating surface, labor, everything before and possibly everything following, because in some mills the machine production is governed by beating capacity.

Piping

Follow on into the machine room basement. Water and stock pumps are all wasting power. Why? Because improperly placed or poorly designed and too small piping, as well as old, worn out pumps or pumps placed when the paper machine was running 250 feet, are still being used with the speed of 500 feet or more, by simply speeding them up—waste.

Paper Machine Screens

Are the paper machine screens wasting stock? If any fibre is being rejected, it has a value—save it. Why withhold these causes of waste longer from the junk man? There are prob-

ably half a dozen water pumps supplying water where one central water system with proper filter would do the work with a saving of from 50% to 75% of the power, saving also maintenance, labor and material.

Suction Pump

What kind of a suction pump is used and is it doing its work in an economical manner?

Clothing

Look into the life of wires, felts and jackets—why does the felt wear out in two weeks with old rusty iron felt rolls when with rubber covered rolls the life might be doubled—waste. Where is the white water going from machine mixing box and how much is being wasted from the save-all under couch?

Steam for Drying

Look into the drying pressure and use of steam per pound or ton of paper and get someone versed in the scientific drying of paper to show you where you can save the 25% to 50% of the steam now being wasted and how you can get more paper and better paper at the same time. Again, the vapor arising from the paper is probably being blown out of doors and wasted, while it contains valuable heat units for re-use either in drying, or in heating the room, or to supply hot water for various production purposes. Heating engineers are available at no cost, to explain this waste.

Broke

Follow the paper from drier to calenders, to reel and to winder—weigh the broke that goes through the convenient broke hole, or holes, into the basement. Some mills show as high as 15% of the paper made going back to the beaters as broke—waste that can be cut in two, three and even four by proper follow up; there's a reason for all waste—eliminate the cause, no matter who or what.

Hoods, Etc.

Dryer felts are many times damaged or worn out before half their proper life is gotten from them. I have seen this caused by sulphuric acid in the sulphite used or from excessive use of alum, also by improperly designed hoods, causing a wet streak that even a dryer felt dryer could not correct. The shorter life is waste—remove the cause. An hour per day average is enough to wash up and change clothing. If more is used, it is wasted.

He Who Knows It All

But, one of the worst causes of waste is the superintendent who thinks he knows it all, who thinks he is too good to belong to this section of the American Paper & Pulp Association, for the man who thinks he knows it all and cannot learn from his fellow man, his competitor, if you please, is not only going backward, but is at a point where others can learn little from him, except not to do as he does.

The next worse cause of waste is the owner, the manager, or the superintendent who will not see when his errors are pointed out to him. He does not deserve to and cannot be expected to get into line.

However, I believe that with the saving of all forms of waste in the pulp and paper industry, many plants now in the red can be put into the pay class, not by demand increasing the selling price, but by the savings reducing the cost.

If I have said anything herein of value to anyone, my time at least, has not been wasted.

Sulphite Mill Control*

BY O. L. BERGER

G. D. Jenssen Co.

N this paper I shall only discuss such control as is now used, or could be used, to assist the superintendent in his daily routine work. I have found that much of the technical work carried on in some mills is really scientific research work of no immediate help to the operator while its ultimate value in assisting the industry at large in obtaining information for future use is of great importance.

"Slashing" the Trees

As the manufacture of sulphite pulp really starts in the woods it is evident that the first step in control should be taken in the pulpwood camps. It is significant that the word "slashing" has become the name for cut over timberlands in this country. "Slashing" is a good name. Everything is "slashed down," big trees, little trees, young trees and seed trees. Nothing is left but the brushpile and a wonderful opportunity for the forest fire which is sure to come to rob the land of all fertility for years to come. Forestry control is probably the most crying necessity in the paper industry today and let us hope that steps will be taken so that a few trees at least will be left for our children.

Buying the Wood

Taking it for granted that the woodsoperator knows his business and gets the maximum value out of his limits, it is up to the pulp manufacturer to buy the wood. He buys a "cord" of wood and he buys nothing. A "cord" is 128 cu. ft. of wood piled regardless of size, crooks and protruding knots. Actual measurements have shown that there is a variation of 20% in the solid wood content of a cord of wood of different diameters and this difference can even be larger if the sticks are knotty and crooked. If the pulpwood is bought according to board feet measure the difference is even greater. 1000 ft. of 4" logs contains for instance 296 cu. ft. of solid wood, while 1000 ft. of 24" logs contains only 127 cu. ft. No wonder the "yield" changes without any apparent cause. In the Scandinavian countries pulpwood is bought as solid wood and we should do the same. If we buy 100 cu. ft. of wood there should be no dispute except as to rot and correct prices. If we buy spruce, we should not be satisfied with balsam or jackpine. The control of the incoming wood in most mills is left to a scaler or woodyard foreman. If we realize that 60% of the cost of the sulphite is in the pulpwood, we would probably put more stress on this control. I would recommend you to spend a little time once in a while with your scaler in the woodyard, and if you do, you probably will find reason to carry your grievances to the main office. A papermaker will not stand for any variation in the grade of sulphite he puts in his beater, nor is he satisfied to buy a ton of wet pulp and not know how much fibre he is getting. You sulphite superintendents are exactly in the same position as regards your pulpwood.

Storing of Pulpwood

The proper storing of the pulpwood to protect it from fire, decay and worms should be controlled, also the use of the wood so as to consume the oldest wood first. Many mills are "saving money" by using wood directly from the cars and letting the old wood rot in the yard. As the wood loses 10% in value for each year it is stored from decay alone, I think you will agree that this is poor economy.

Preparing the Wood for the Chipper

In preparing the wood for the chipper there are two main things to control, namely waste of good wood in the barking operation and the proper cleaning according to grade of pulp manufactured. It is useless to be as careful if newsprint sulphite is wanted as if you made high grade bleached pulp. It is however a good thing to remember that most of the specks in the finished pulp originate in the wood and that a careful sorting and inspection in the woodroom is the only remedy.

Making of Chips

The making of chips is a very important step in the manufacture of sulphite and here is where your laboratory can be of great help. The chips should be tested for size at least twice each day and the superintendent's attention called to any variations. The test figures should be plotted as a graphic curve so variations can be seen at a glance. By proper feeding of the wood to the chipper and a careful physical upkeep of chipper, crusher and chip screens there should be no trouble in obtaining chips 90% perfect, containing a minimum of sawdust and slivers. Some mills are also testing the chips for moisture and weighing the total amount going to the chip loft, but very few mills are able to regulate the further treatment according to the variation in the moisture so the real value for most mills in this case would be as a final check on the woodroom.

Acid Making

The acid making is essentially a chemical process and is controlled by analytical tests. The recording pyrometers and gas testing machines are helpful in keeping a constant gas while the acid itself should be tested frequently to guard

*Paper read before the Holyoke-Springfield Convention of the American Pulp and Paper Mill Superintendents Association, at Hotel Kimbal, Springfield, Mass.

against variations. A meter on the water for acid making is useful and the total water used should be checked against sulphur consumed and the theoretical amount of sulphur in the raw acid to establish the chemical balance of the acid making operation and the efficiency of the acid system. A constant gas test and the constant flow of water is generally a good safeguard against acid trouble.

SO_2 and Free Sulphur

The presence of SO_2 in the burner gas is regarded by many as very detrimental and gas washers are now being installed to remove all SO_2 before the gas reaches the acid system. I hardly believe that SO_2 plays any important part in the cooking of sulphite as it is neutralized by the lime and precipitated as gypsum which hardly influences the chemical reaction in the digester. What is of more importance to guard against is free sulphur which is easily brought into the acid through sublimation and which will cause a decomposition of the cooking acid during the cook forming free SO_2 which will attack the fibres directly and cause dark and brittle pulp. A gas washer will also remove free sulphur from the burner gas and eliminate all danger from this source. A gas washer is therefore very helpful and will no doubt be in general use before long as a control of the burner gas.

Steam Flowmeters

The control of the digesters with recording thermometers, pressure gauges and steam regulators is too well known to be discussed. I think, however, that the use of steam flowmeters for each digester has given such wonderful results that they will soon be used as standard equipment. A flowmeter will tell not alone the total amount of stem consumed at any time, but the rate of the inflow and enables the cook to economize on steam at periods when not needed and besides this it has proven a great help in avoiding peakloads on the steam plant. The control used for determination of the finishing point of the cook is also too generally known to be discussed. I had an opportunity recently to study the Decker cooking process used at Price Brothers sulphite mill at Kenogami, Quebec. This process consists mainly in the injection of hot liquor and gas from a digester that is being finished into one just going up to pressure. Reports from the mill claim an enormous saving in steam and above all a perfect control of the cooking with increased yield and a stronger and cleaner pulp. This process is patented and will no doubt be received with interest when it is put on the market.

Control of Reclaiming of the Acid

The reclaiming of the acid is controlled by the use of individual coolers for each digester and the proper construction of acid storage tanks and reclaiming towers. The correct "building up" of the raw acid to cooking acid of desired strength is easily controlled by chemical tests. This test is all the control that is needed and tells the tale of good or poor reclaiming.

Eliminating Milleffluents, Screenings and Dirt

After the pulp leaves the digester on its way to the beater or car, the main things to watch are milleffluents, screenings and dirt. The Waste Committee of the T.A.P.P.I. is now working out standard methods for sampling white water and is studying the various makes of save-alls. The correct way of controlling the white paper is to take samples at fixed intervals to be tested for pulp and also to take frequent samples from individual machines. The knotscreen should be inspected often to guard against good pulp going into the screenings as well as knots getting into the good pulp through broken plates.

The counting of specks and grading of colors is systematized. Some mills figure specks per pound of stock which is more correct than per square foot of pulpsheet as this will vary in thickness.

The strength test obtained by the use of the ballmill and handsheet can be done in a reasonable length of time so as to be of help to the operator and in any case it is valuable where grading of the pulp is wanted.

The testing of the pulp for moisture is generally made according to the standard methods adopted by the Technical Associations and are accepted as decisive in case of disputes.

The Bleach Plant

Now a few words about the bleach plant. The control of the sludge for chlorine is often neglected. I know of cases where 10% of the available chlorine is wasted in the sludge. The actual bleaching operations where high temperatures are employed necessitate the use of a recording thermometer to guard against overheating. The use of the tintometer for determination of color desired has proven of great value. After the bleached pulp is washed it should be tested for free chlorine which will deteriorate the fibre if allowed to remain in the pulp.

Eliminating Dirt in the Mill

The pulp is now finally ready to go to the beaters or to the railroad car for shipment. Suppose that all possible care has been taken to secure strong, clean pulp. At this point we know how easy it is to get into trouble by allowing external dirt to get into the pulp. We find dirt coming through open windows, from smokestacks and ashblowers, dirty floors and workmen stepping on the pulp with muddy feet. We also find that proper care is not taken in cleaning and lining the railroad cars and that dirt will get on the pulp from dust and through cracks in car doors. The railroad cars should be carefully swept, floors, walls and ceilings lined with strong, clean paper and the pulp piles covered with paper so that no loose dust and dirt can get in contact with the pulp during railroad transportation.

The life of a sulphite superintendent is indeed one of chasing dirt and he will never be successful if he allows his mill to be dirty and sloppy.

The Research Laboratory

In the first paragraph of this paper I mentioned "scientific research." It is easy to get this mixed up with mill control. Don't think that your chemist cooking in his laboratory will be able to control your operations. Co-operate with him and tell him what you would like him to do and I am sure he will be anxious to help you. That is what he is there for and he has a wonderful opportunity to be useful to you if you will let him.

There are today some 129 sulphite mills on this continent and I don't think two mills operate alike. They use different size chips, different acid, different temperatures, pressures and cooking time. There is I suppose one certain method that is the best, but nobody knows which. How are we going to find out? Look at the oil and steel industries. How did they come to their present methods of scientific operations? By spending money for the best brains to work out their problems. The sulphite manufacturers could do the same. If each mill paid a small sum of money toward the upkeep of a research laboratory working under mill conditions, I venture to say that we would be surprised to know how little we really knew about our own business.

Uehling Instrument Company, Paterson, N. J., manufacturers of CO_2 recorders and draft and vacuum gauges, have just made two important agency appointments, namely Amsler-Morton Co., Fulton Building, Pittsburgh, Pa., for Western Pennsylvania and Mr. John A. MacDonald, 2039 Railway Exchange Building, St. Louis, Mo., for eastern Missouri and southern Illinois. Mr. H. R. N. Johnson, who formerly represented the Uehling Instrument Company in Minnesota and the Dakotas, has joined the W. P. Nevins Company, 120 South Ninth Street, Minneapolis, Minn., which company is now the official Uehling representative, in the territory mentioned.

In order to provide more adequate facilities for their increasing volume of business in the Pittsburgh District, the Pennsylvania Crusher Company has recently moved its offices from the Peoples Bank Building to more adequate quarters in the Oliver Building, where operations will be continued under the experienced management of Mr. H. M. Hallett, as District Manager. The business of the Pittsburgh Office is largely concerned with "Pennsylvania" coal preparation machinery for mines, by-product coke plants, central stations and industrial power plants, and with heavy duty primary and secondary crushers for large cement and lime plants.

A letter recently received from The Clifton-Pratt Co., 1224 West Eighth St., Cincinnati, reads in part as follows: "We are making efforts to purchase some pulp mill equipment for a new industry about to be under way here for the production of containers to be made of pulp. This proposition covers the complete equipment with machinery of a complete plant."

The Saranac Co., Plattsburg, N. Y., is planning to build a pulp and paper mill in that town, work on which will be started at once.

Plans for the erection of a new one-story building have been filed by the Phil-Fiber Boxboard Mills, Inc., Philadelphia.

Northwestern Superintendents Hold Two-Day Meeting

A PROPOSAL for a joint annual meeting of paper mill superintendents, technical men and cost accountants was one of the main considerations at the annual session of the Northwestern division, American Pulp and Paper Mill Superintendents' association, held at Wisconsin Rapids May 18 and 19. At present each organization holds two or more sessions a year and it was proposed to make one of these a combined meeting. A committee was nominated to select the time and place of the next meeting.

The 150 paper mill executives spent part of their time inspecting paper mills including an inspection of the fastest print paper machine in the world running at a speed of 1,000 feet a minute.

At a general session at the Biron Community club papers were read by W. H. Millspaugh, by J. L. Williamson of the J. O. Ross Engineering Company on the "Brinder Economizers and Absorption System," by C. K. Boyer, superintendent of the Wisconsin Rapids division wood room of the Consolidated Paper Company on "Wood Room Problems," and by Vance P. Edwards, sulphite superintendent of the Interlake Company at Appleton, on the subject of "Control of Mitscherlich Cooking."

In the evening there was a social session concluded by a discussion of questions turned in by visiting superintendents. The fall meeting probably will be in the Fox River Valley.

Following is a brief outline of the business session held May 18 at the Port Edwards Auditorium:

Mr. McBain—address of welcome.

Mr. L. E. Smith, Chairman; presiding.

Caucas of Members to National Convention (5).

Mr. Smith asks for suggestions from members present as to the best locality to hold fall meeting.

Mr. F. C. Boyce suggests Marinette and Menominee as proper place for meeting, saying that meetings have been held at Green Bay and Menasha. No interest has been taken in and around Appleton to warrant its choice as a meeting place.

Mr. McBain suggests Green Bay as a good locality with a large variety of mills.

Mr. Slater would like to have them at Escanaba Mill but is afraid the town can not handle a large body of men.

Mr. King of Dupont suggests that a meeting be held in Milwaukee at the time of the Wisconsin Products Show—unlimited opportunities and facilities there for convention. Discussion of holding joint meetings with the Technical Association Members and the Members of the Cost Association. Everyone in favor of one joint meeting a year and one destinctive association meeting.

Motion made that Chairman appoint Committee to discuss and locate the city where the next convention is to be held; this committee to report later.

The combination of the office of the National Secretary with that of the office of the National Secretary of the T. A. A. P. I. was discussed at length. The general opinion is to the effect that Mr. MacNaughton could handle the affairs of the Superintendents Association to a better advantage than one not connected with the paper industry.

Motion made and seconded that The Northwestern Division go on record as favoring Mr. MacNaughton as our next National Secretary, if his terms are favorable. Motion carried.

Motion made and carried that Mr. McBain, as a committee of one, to attend the meeting at Dayton, Ohio, be instructed to voice the opinions of the Northwest Division in regard to the relationship between the Superintendents Association and the Technical Association.

Some discussion on Amalgamation of the three associations—Superintendents—Cost—and Technical, by Mr. Jasperson, Mr. Boyce, Mr. McBain, Mr. Gleason and Mr. Thiele. All discussion was in the line of suggestions and no action was taken.

Mr. Boyer expressed the opinion that this meeting could not decide for amalgamation under the present circumstances, this being a mixed meeting.

Mr. Smith assured Mr. Boyer that this body would not take any action and that only suggestions were being made.

Several technical men were asked to give their version of this subject. Each one thought that a joint meeting would be excellent but expressed doubt about the amalgamation, or the fusing of the associations.

Mr. Gleason suggested that Cost Accountants be called Superintendents of Costs and allowed to join Superintendents, thus creating greater harmony between two.

Mr. Jasperson very enthusastic about joint meetings but did not express an opinion in regard to Amalgamation.

Telegram read regarding the sending of orchestra to Springfield. Publicity for division is the object. Cost to be subscribed by members.

Mr. Smith asks a rising vote of thanks to the ladies who have prepared banquet.

Mr. Rooney gave illustrated talk on the Manufacture of Felts and a talk on Travels in Japan. Very interesting and instructive to all. Takes in the manufacture of wool felt from the time it is taken from the sheep's back throughout the many intricate processes to its final form as a paper maker's felt. Gives the paper and pulp maker a clear, concise idea of the infinite care taken by the felt company to eliminate any imperfection in the manufacture of a perfect woolen felt. The slides also indicate some of the obstacles which the feltmaker has to contend with in making the felts, such as rush orders, special sizes, etc. Mr. Rooney's talk on his travels in Japan was also very good, the slides showing the picturesque country and the novel way in which the Japanese have coped with their various engineering problems.

List of Those Registered

C. J. Christansen, Fibre Making Processes, Chicago; Earl L. Akey, Biron Div.; F. C. Brown, Biron Div.; A. L. Beatz, Biron Div.; C. K. Boyer, Wisconsin Rapids, Wis.; J. A. Adams, Stevens Point, Wis.; Geo. Damitz, Biron Div.; Warren Beadle, Jr., Biron Div.; S. C. Brayton, Wisconsin Rapids, Wis.; S. V. Burrows, Process Engr's Inc., N. Y. C.; G. W. Benton, N. Y. C.; R. H. Alexander, Port Edwards, Wis.; P. D. Barow, Rothschild, Wis.; A. G. Adams, Chicago; C. E. Curran, Forest Products Lab.; P. K. Baird, Forest Products Lab.; W. E. Beadle, Sr., Wisconsin Rapids, Wis.; Bernard Benson, Williams Gray Co., Chicago.; D. B. Davis, Green Bay Nor. Paper Mills; F. C. Boyce, Wausau Paper Mills, Brokaw; F. A. Beisel, Menasha Printing & Carton Co.; F. E. Dial, Vacuum Oil Co., Chicago, Ill.; Jas. Foxgrover, Vera Chemical Co.; M. F. Foster, Wisconsin Rapids; T. L. Edmonds, Wausau, Wis.; Frank B. Eilers, Kalamazoo, Mich.; R. W. Haddock, Escanaba, Mich.; John F. Hercher, John Strange Paper Co.; W. H. Guidotti, Leavens-Guidotti Co.; Joseph Gille, Ford Howard, Pa.; John Hardt, Menasha Printing & Carton Co.; John Hanson, Menasha Printing & Carton Co.; C. H. Jackson, Bayley Mfg. Co., Milw.; C. A. Jasperson, Port Edwards; Edw. Johnson, C. W. P. P. Co.; W. W. Johnson, Ashland Paper Co.; F. H. Johnson, Jr., Improved Paper Mch. Co.; A. J. Kull, Grand Rapids, Minn.; M. A. Leibreich, Great Western Paper Co., Lady Smith, Wis.; M. Kavanaugh, Manhattan Rubber Mfg. Co.; F. C. La Brot, Stevens Point, Wis.; R. H. Kelly, Marathon Paper Mills Co.; Vance P. Edwards, Appleton, Wis.; C. L. Bachelder, Appleton, Wis.; Wm. R. Kolp, Lubriko Co., Phila. Pa.; O. L. Le Roux, Port Edwards, Wis.; Paul Joslin, Park Falls, Wis.; J. H. Lynch, Vacuum Oil Co., Chicago; F. S. Murphy, Lockport Felt Co.; A. J. Na Deau, Wisconsin Rapids, Wis.; A. W. MacNabb, Minneapolis; M. J. Powers, Nekoosa Motor & Mch. Co.; A. C. Miller, Wisconsin Rapids; B. T. McBain, Port Edwards, Wis.; W. H. Nillspaugh, Sandusky, Ohio; N. A. North, Green Bay, Wis.; W. Prebbanow, Wisconsin Rapids, Wis.; J. B. Nash, Wisconsin Rapids, Wis.; R. A. Peterson, Appleton, Wis.; Wm. H. Kraske, Wisconsin Rapids, Wis.; E. R. MacLaren, Albany Felt Co., Albany, N. Y. Ed. Panueshka, Federal Rubber Co.; L. E. Smith, Nekoosa Edwards; F. M. Schnabel, Consolidated W. P. & P. Co., Biron; Andrew J. Thompson, Great Western Paper Co., Lady Smith, Wis.; Albert Zager, Biron Div.; Chas. Ramsden, Beloit Iron Works; W. H. Theroux, Chicago, Ill.; E. H. Stoddard, Appleton, Wis.; Del. Rowland, Biron; John Stevens, Jr., Appleton; Fred G. Risser, Stevens Point; C. A. Silvis, Grand Rapids, Minn.; H. C. Reimer, Kuttroff Pickhardt & Co., Chicago; Jos. H. Slater, Escanaba, Mich.; J. R. Simpson, Wisconsin Rapids, Wis.; F. J. Timmerman, Northern Paper Mills; B. H. Sher-

man, Northern Paper Mills; S. E. Tomczak, Flambeau Paper Co.; Al. Rogers, Vacuum Oil Co., Ishpeming, Mich.; M. C. Swenson, Biron Div.; Casper E. Youngchild, Nekoosa, Wis.; R. J. Winnige, Ladysmith, Wis.; A. F. Wilcox, United States Rubber Co.; Geo. Wakeley, Wisconsin Rapids; E. P. Gleason, Port Edwards, Wis.; John Alexander, Port Edwards, Wis.; Gust Enderlein, Port Edwards, Wis.; A. Wiberg, Gilbert Paper Company, Menasha; John D. Watson, Wisconsin Wire Works; R. E. Watson, Wisconsin Wire orks; Jos. J. Plank, Jos. J. Plank Co.; Andy Weir, Brokaw, Wis.; C. A. Wiley, Nekoosa, Wis.; Kenneth T. King, Chicago, Ill.; E. A. Ayerson, Stevens Point; P. J. Kummer, Tomahawk, Wis.; D. J. Mc, Oconto Falls, Wis.; H. Gevers, Kaukanna, Wis.; Lyman Beeman, Wisconsin Rapids; John D. Henderson, Paper Industry; Chas. L. Kraske, Wisconsin Rapids; J. L. Williamson, Chicago.

Letter Read Before Northwestern Division Meeting

White Water Losses

Mr. Chairman and Gentlemen:

If I could have been present at your meeting I would have talked on white water losses and told you something of what is being done in the industry. As I cannot be in attendance I will present a few thoughts which, if they provide a basis for discussion, may be as productive of value as if I were present.

We know that in all mills there is loss of material, mostly fiber, but we know of few mills that can give any accurate estimate of this form of waste either in actual quantity by weight or in percentage of the daily product.

If the shrinkage in conversion is down to 5% or less by the accounting figures usually every one is satisfied even though the sewer discharge is easily seen to contain stock.

Since in a paper mill, particularly if there are pulp mills in connection and the groundwood and sulphite is slushed, and the best accounting figures are a guess, there should be a check somewhere if it is possible. In some mills, and it may have been your experience, the figures have shown that 100 lbs. of paper had been made all during the month from 99 lbs. of stock even without allowing for the difference of 3% of moisture between the paper and the calculated weight of the pulp.

I do not want to talk on cost accounting but it is valuable for the superintendent and the accountant to see that the records are based on reason as well as on apparent fact.

Since in many mills from the nature of things it is impossible to get the actual weight of the stock used while it is in process, it is very evidently necessary to have as many checks as possible.

Checks that are wanting in most of the mills are the quantity of water discharged from the mill and the amount of material per 1,000 gallons it contains.

It has been found that of two mills making the same product under the same general conditions of manufacture, one uses, that is discharges, 10,000 gallons of water per ton while the other uses over 25,000 gallons. The fiber in the effluent per 1,000 gallons might be the same yet the second would be losing 2½ times the first.

It is very good to have screen savealls and to give attention to their upkeep but it is becoming recognized that in addition the value of the effluent be measured and tested for the quantity of material it carries.

W. G. MacNAUGHTON,
Secretary, T. A. P. P. I.

Suction Rolls*

By W. H. MILLSPAUGH

WHEN the invitation came to attend this meeting with a distant date named, giving plenty of time for compiling records of tests and data collected over many years, it seemed that enough service might be rendered the superintendents to justify the preparation of a paper. Anticipation of the pleasure of meeting old friends and getting acquainted with those who have taken over superintendencies since visits to Wisconsin mills were regularly made, was more likely the reason I so readily accepted.

When compilation of scrap book records was started this week, I discovered that, what I supposed was a valuable fund of information, was in fact, of little value in preparing the paper I had in mind, as so many related and necessary items of information were omitted from many of the records, that comparisons could not be made with assurance that the comparisons actually were representative.

Perhaps the mention of this experience may have a value to others by suggesting the preparation of forms that, when completely filled by the observer, may at any time be used to check similar records.

Everyone knows that stocks vary and that different preparation in beater and jordon greatly changes similar stocks, giving wide ranges of conditions on the machine. Without the lacking data, I have been obliged to limit to a few statements in this paper what I had hoped to develop into something more "worthy."

The data available would answer dozens of specific questions, such as power for a given purpose, increased production, finish, kinds of paper made over suction rolls, etc., but for lack of related data, it is on news and book only that we may with assurance make fairly correct statements of similar machines.

The records of a new 232" machine (A) with suction couch and three plain presses (no suction press) may be compared with another machine (B) having suction couch with suction first press and plain second press, to advantage. It will be seen that "A" sent paper to driers 26.16% "bone" dry. Each ton of paper made, therefore, required the evaporation of 5,660 lbs. of water, while "B" sent paper to driers an average of 29.85% bone dry with 4,700 lbs. water or 960 lbs. per ton less water to be evaporated.

On an assumed production of 80 tons per day, this means 76,800 lbs. extra water per day to evaporate. If coal used, on basis of 1 lb. of coal to 4 lbs. of water evaporated over driers, which is a good record, then 19,200 lbs. a day, 5,760,000 lbs. a year of 300 days, or 2,880 tons more coal would be used. At $7.00 per ton, this would be $19,160.00.

"A" compared with tests at "C" mill using suction couch and suction first press and two plain presses on three machines averaging 29.7% bone dry of driers, shows 927 lbs. of extra water per ton of paper made to be evaporated.

D's "D" is 27.45% bone dry to driers on machine running much faster, giving 5,284 lbs. water per ton of paper to evaporate, or 374 lbs. less than "A." Moisture to driers is not the only measure of results. If the moisture leaving plain first press is compared with suction first press, it will be noted that second felts on machine without suction press must do more work and will need washing more often and there will be many more press breaks. "A" expresses satisfaction with its installation, and has ordered duplicate for machine now being built.

The recorded tests do not indicate any advantage in the use of the two-compartment suction box used by "A." Each compartment is connected up to two pumps, a total of four pumps on a single suction couch roll. Tests conducted by us with extra width boxes and those made in Germany with boxes having several compartments, show no advantages gained by this arrangement, which is not as simple to care for as a single box.

Great Western Paper Co. with suction couch and suction press on news, ran couch 18.5% dry, first press 25% dry, second press 34% dry and third press 38% dry. This is one of the best tests for dryness of news of which we have record, although the speed was slow—only 365 feet.

Fewer Breaks with Suction Press Rolls

Cliff Paper Co. has two machines, one equipped with suction couch and press and the other with suction couch only. While these machines are smaller and slower, the results taken in connection with the results above mentioned, are significant. The average of 78 tests from suction press was 29.548% dry. On the other machine with plain press, a great number of tests made averaged 25.405% dry. Greater pressure was applied to the top roll on the plain press than to the top roll on the suction press. On these two machines, all the breaks were recorded for two months, including those on the wire from every cause, such as Dandy pick-ups, etc., on first press, second press and calenders. The tabulation showed the machine with suction couch and press had one-third the breaks of the other machine with ordinary press rolls.

I have long been of the opinion that on newspaper running at high speed, if but one suction roll were used, the suction press should be first installed. This tabulation confirms the opinion. An ordinary snap-off at the couch rolls on a paper machine producing 3,000 lbs. per hour, averages 5 minutes off the reel, 250 lbs. of broke, either wet or dry, must, therefore, return to the beaters for each such snap-off.

For high-speed machines, it would undoubtedly be a most excellent investment to use suction press rolls throughout the machine. A few comparisons from the recorded tests of book machines with and without suction couch rolls would be

*Paper read before the Northwestern Division of the American Pulp and Paper Mill Superintendents' Association, Port Edwards, Wis., May 18 and 19.

Chart to Be Used in Conjunction with Mr. Millspaugh's Paper

MILL	Mach. No.	Width	No. Presses	Furnish and Weight	Speed in Feet	Dry Tests % Bone Dry: Inches Vacuum at Couch	% Dry Suc. Couch	Inches Vacuum at Press	% Dry Suc. Press	% Dry 2nd Press	% Dry 3rd Press	% Dry To Dryers	Plain Couch	Plain First Press	2nd Press	3rd Press	To Dryer
B	...	166	2	News	660	x	14.53	x	29.37	30.58	.....	30.58	.....	.....	.....	.....	.....
B	...	166	2	News	648	x	16.54	x	26.12	28.01	.....	28.01	.....	.....	.....	.....	.....
B	...	166	2	News	700	x	13.02	x	28.06	30.96	.....	30.96	.....	.....	.....	.....	.....
Average of 3 tests	...	...	...	News	670	x	14.75	x	27.85	29.85	.....	29.85	.....	.....	.....	.....	.....
A	5	232	3	News	635	x	12.64	.....	.....	.....	.....	.....	.....	14.64	24.12	26.16	26.16
D (Average of 16 tests)	8	166	4	News	xx	9.4	x	9.0	26.5	26.2	26.5	27.2	.....	.....	.....	.....	.....
D (Average of 14 tests)	8	166	4	News	xx	10.2	x	9.7	26.7	26.7	27.0	27.8	.....	.....	.....	.....	.....
C	2	166	3	News	812	15.6	12.3	16.8	27.6	28.1	28.7	28.7	.....	.....	.....	.....	.....
C	3	164	3	News	801	10.4	12.9	11.2	26.2	27.2	32.3	32.3	.....	.....	.....	.....	.....
C	4	166	3	News	781	9.0	12.7	10.4	25.8	27.6	28.1	28.1	.....	.....	.....	.....	.....
Average Three Machines	...	...	3	News	798	11.7	12.6	12.8	26.5	27.8	29.7	29.7	.....	.....	.....	.....	.....
Mead Pulp & Paper Co.	2	...	2	45# Book	...	.....	22.4	.....	.....	.....	.....	.....	.....	38.8	41.1	.....	41.1
Mead Pulp & Paper Co.	3	...	3	45# Book	...	.....	.....	.....	.....	.....	.....	.....	21.1	34.6	35.9	36.7	36.7
Wheelright Paper Co.	...	...	2	44# Book	...	.....	25.0	.....	38.0	42.0	.....	42.0	.....	.....	.....	.....	.....
Kimberly-Clark	...	152	3	60# Book	...	.....	26.6	.....	33.8	46.6	.....	.....	.....	.....	.....	.....	.....
Junkin Paper Mills	...	...	2	19# Wxg.	235	.....	.....	.....	26.8	33.0	.....	33.0	.....	.....	.....	.....	.....
Marathon Paper Mills	...	...	3	40# Bond	284	.....	16.0	.....	23.6	27.5	30.4	30.4	.....	.....	.....	.....	.....
Hammermill Paper Co.	1	...	3	18# Bond	325	.....	.....	.....	.....	.....	.....	.....	19.41	21.69	23.1	23.81	23.81
Hammermill Paper Co.	1	...	3	19# Bond	305	.....	20.19	.....	.....	.....	.....	.....	.....	26.62	29.63	34.23	34.23
Hammermill Paper Co.	2	...	3	13# Bond	350	.....	.....	.....	.....	.....	.....	.....	15.58	20.49	25.50	26.12	26.12
Great Western Paper Co.	...	...	3	32# News	365	.....	18.5	.....	.....	.....	.....	.....	.....	25.0	34.0	38.0	38.0
Sears Roebuck Co.	1	132	3	61# Hg'g.	275	10.0	21.0	.....	.....	.....	.....	.....	.....	27.0	36.0	.....	36.0
Dells Paper & Pulp Co.	2	106	2	57# Hg'g.	250	15.0	17.0	16.0	24.7	31.0	.....	31.0	.....	.....	.....	.....	.....
Dells Paper & Pulp Co.	2	106	2	57# Hg'g.	283	15.0	18.0	16.0	28.0	32.0	.....	32.0	.....	.....	.....	.....	.....
Tomahawk Pulp & Paper Co.	1	80	2	22# Cat.	500	x	x	14.0	31.0	37.0	.....	37.0	.....	.....	.....	.....	.....
Tomahawk Pulp & Paper Co.	2	120	2	22# Cat.	525	x	x	.....	27.5	33.0	.....	33.0	.....	.....	.....	.....	.....
F	2	110	2	30# B. K.	440	.....	13.0	.....	27.0	30.0	.....	30.0	B16.0	26.0	28.0	.....	28.0
F	2	110	2	50# B. K.	...	.....	15.0	.....	28.0	29.0	.....	29.0	.....	.....	.....	.....	.....
F	2	110	2	25# B. K.	...	.....	11.0	.....	27.0	28.0	.....	28.0	B14.0	27.5	28.0	.....	28.0
Dells Paper & Pulp Co.	2	106	2	60# Man.	255	16.0	20.00	18.0	26.5	35.0	.....	35.0	.....	.....	.....	.....	.....
E	1	...	3	25# Kraft	380	.....	11.41	.....	34.27	35.32	35.71	35.71	.....	.....	.....	.....	.....
E	1	...	3	30# Kraft	380	.....	11.21	.....	32.25	35.0	37.11	37.11	.....	.....	.....	.....	.....
E	1	...	3	50# Kraft	300	.....	16.47	.....	32.83	38.0	43.23	43.23	.....	.....	.....	.....	.....
E	1	...	3	60# Kraft	250	.....	18.33	.....	24.56	27.77	31.0	31.0	.....	.....	.....	.....	.....
E	1	...	3	80# Kraft	200	.....	18.0	.....	28.93	35.0	41.8	41.8	.....	.....	.....	.....	.....
E	3	...	1	20# Kraft	1000	.....	.....	.....	32.0	.....	.....	32.0	.....	.....	.....	.....	.....

B—Before Rolls Installed. x—No Record. xx—No Record, but 800-1100 feet.

interesting, but as more than 70% of the paper machines in the U. S. making book papers are already equipped with suction couch rolls, it would perhaps be of more interest to the paper-maker to learn of suction press rolls on book machines.

Suction press rolls have not been installed on many machines running continuously on book paper. There are many, however, running on catalog, sulphite bonds, etc. With the help of the felt manufacturer, it is expected that a greater number of paper-makers will have the advantage of the use of suction press rolls on the finer grades, the only difficulty heretofore experienced having been a tendency to mark the paper if the felt were not right or if too great pressure was applied to the top roll. The advantage of safe running and getting a drier sheet at the first press on all tender sheets like book, is obvious.

The Kimberly-Clark Co. have one machine making paper very similar to book, and I trust a representative from that mill is present and may be free to speak of their results, as the only information we have is "no marks, increased tonnage and general satisfaction."

The Marathon and Watab Mills also have had experience that would be helpful to the superintendents of other mills. I would like to avoid subjects that might give the impression of sales propaganda in this discussion and will turn to troubles.

Every superintendent has had trouble with almost everything around his mill and suction rolls are no exception, notwithstanding their simplicity. Some trouble, and, in fact, one of the most serious, is one that neither the paper-maker nor we, as manufacturers, are responsible for. I refer to the two strips of rubber cemented canvas packings used in the suction box to make the joints at the point of contact with the revolving shell. Notwithstanding the care used in the specifications and the care used by the manufacturer of the packing in its preparation, occasionally packings are delivered to us that do not give the service they should, being improperly cured. Sometimes rubber cement is injured by excessive use of kerosene on the wire or is affected by acids, permitting the layers of fabric to separate. Leakage and low vacuum results. The only remedy is new packing properly fitted and sufficient time should be given to fitting the packing and trying it in the roll several times to make sure that the packings have perfect contact their entire length. It takes a long time for these packings to wear to a fit and production will be lowered while attempting to secure a fit in this manner. The paper-maker sometimes releases the set screws that hold the box from locking against the revolving shell and, from below, forces the box up tight against the shell in hopes of getting a fit, without removing the box and dressing. This is worse than useless. There is danger of scoring the shell, but in addition, the entire box will spring down at the center, defeating the end sought. It has been observed that with a practically perfect fit throughout the entire length of both packings, except for one low spot on one packing, while it could not be noted that the vacuum was lowered, yet the paper at this particular spot runs wet and soon fills a streak in the felt. Observation indicates that unless the paper is running exceedingly wet and in streaks from the flat boxes, that if wet streaks shoot down part way across the suction area on the suction couch roll, the packings need attention. When a clean, sharp line is observed across the entire width of the wet sheet, it is certain that the packings are fitting properly.

Putting in New Deckles

In inserting new rubber deckles in suction rolls, it is necessary to remove the box in order that the rubber may be dressed down to the proper circle to fit the shell and to the height of the packings. In a number of instances, rubber deckels have been installed as received from the works without dressing, the result of course being that the packings were kept from contact with the revolving shell—result, no vacuum, no paper.

It is safe to say that practically all of the troubles experienced with suction rolls are those enumerated above. Except for the occasional imperfect packing, all of these troubles are the result of improper fitting and handling of the suction roll.

The water is removed from paper with suction rolls by passing large volumes of air uniformly through the paper. It follows that perfect fitting packings being necessary at the suction roll, and as paper is dried over suction rolls by carrying large volumes of air uniformly through the sheet, that pumps should be used which maintain their efficiency under all operating conditions, and as the volume of water delivered to the pump is a changing amount with the different grades of paper made, and for other reasons, it should be a pump that will handle the fluctuating volume of water without materially decreasing its capacity for air.

Bearings

The high-speed machine has made it possible to have quite generally adopted the "roll ball" type of bearings. These bearings permit the highest possible speed on the machine without heating and, if adopted, will eliminate all bearing troubles. Incidentally, these bearings we have thoroughly proven through years of service which is more difficult than that met with in paper-making. As the additional cost is not great for these bearings, they will probably become standard construction for practically all speeds; surely for all press rolls. In the aggregate, very little trouble has been experienced from plain water-cooled bearings heretofore used.

The practice at Bryant Paper Co. is to be commended. After the packings were fitted to the shell and the box properly located by the holding down set screws, the screws adjusting the tension of the supporting springs were removed and an order issued that a machine tender making any adjustments of the holding down screws would be discharged without other reason. The result being that with all their rolls and the many years they have been in use, their record for repairs and complaints is almost blank.

It is not amiss to repeat what has often been published, that vacuum at suction rolls is a sure indication of the character of the beating. The better the stock is closed in the beaters and jordon, the dryer it may be run over the paper machine if equipped with suction rolls. The Hammermill Paper Co. has a vacuum gauge in the beaterroom calibrated with the one on the machine that the beater man may know how his stock is running. A little extra care and power in the preparation of the stock is apt to result not only in a better sheet but in saving of steam for drying. This statement is true of all machines equipped with suction rolls, but it is of particular importance where suction press rolls are not used.

Power

In Canada, where in many mills they have surplus electric power even for generating steam, the cost of power and the savings through watching machine conditions is not as important as in this territory. There was a time when the board maker measured the value of his felt by the number of days it ran, regardless of the extra water he would need to evaporate because of paper going to the dryers wet from one of these long lived felts, coal was cheap, yet, should have been saved.

Someone loosely stated that suction rolls were useful but "require a lot of power." It took time to prove that suction couch rolls do not take as much power as plain couch rolls. It does take power to operate the pump, which is not used with old couches, but the saving in steam at the dryers through having a uniformly dried sheet without wet streaks and with the lower moisture content, more than offsets the power required for the pump. A study of results on many individual machines prove that the installation of suction rolls results in saving of power for a given tonnage, and in addition permits a greater tonnage to be made, thus utilizing the investment in the machine and labor to the fullest extent.

I will refer again to available records. Most of the records we have, have been taken by erecting men and salesmen at the time of installations, and dealt almost exclusively with increased tonnage through safe running and greater speed. It would be tiresome to recite all of these records but it is a fact that they disclose an average increased production of very considerably more than 20%. The per cent of the total investment in the mill for the rolls is very little. The dividends on suction rolls are therefore large, the cost being returned in a few months.

Control in a Mitscherlich Mill*

BY VANCE P. EDWARDES

THE subject, "The Sulphite Mill," which has been assigned to me covers a multitude of sins, so I have selected a small part of the whole with the hopes that my sins will be only little ones. "Control in a Mitscherlich Mill" is the title of my talk.

To start with, I want to say that it is my firm belief that chemically there is no distinction between a Mitscherlich cook and a quick cook. The only differences lie in the method of manipulation.

It might be well to very briefly describe here the cycle of a Mitscherlich cook. As far as I know, all Mitscherlich digesters in this country are horizontal. They are provided with at least two top and two bottom manholes.

Chips are blown into the digester by steam, the top covers placed on and live steam admitted on the top. The chips are steamed from one to two hours and the condensate runs to waste. Sufficient acid is then run in to completely cover the

*Paper read before the Northwestern Division of the American Pulp and Paper Mill Superintendents' Association, Port Edwards, Wis., May 18 and 19.

chips and the steam admitted to the coils. The time to 100° C. will vary from three to six hours, depending upon the radiating surface and the steam pressure. The cook is carried along at pressures from 50 to 65 pounds for approximately 24 hours with a maximum temperature of 125° C.-135° C. About two hours before the cook is completed, the relief valve is opened wide and the pressure blown down to from 30 to 35 pounds when the blow valve is opened. It takes about an hour to blow off. Then the pulp is washed with cold water while in the digester, the bottom covers opened and the pulp hosed out. In all, about seven hours are required from the start of blow off to covers on, making a total time of 31 hours.

The acid used varies with each mill, some running an acid of approximtaely 4.30 total, 2.90 free and 1.40 combined, while others use one of 5.50 total, 4.40 free, and 1.10 combined. Provided the reclamation system is right, I believe that a strong acid has advantages, but I have not found it a good policy to run the combined lower than 1.00 per cent. With a stronger acid the cooking time is shortened, the maximum temperature lowered and possibly the yield increased.

The problem of control divides itself into two parts—acid making and cooking—neither of which should be over emphasized to the detriment of the other.

In the acid plant the efficient utilization of sulphur and limestone to produce a cooking acid free of impurities and of even composition are the desired results.

From the very nature of the cooking process, it is extremely important that the limestone contains nothing that will form a coating on the digester coils. With this end in view, the stone should be tested as received. The insoluble for the most part will be caught in the settling tank or acid tanks, but it is said that iron oxide may cause the formation of sulphuric acid, and in order to play safe, the percentage of iron should be kept as low as feasible. Limestone has been received which ran as high as 15 per cent gypsum, calcium sulphate, which in addition to being a loss in available lime, fills the tower bases, causes a coating to form on the digester coils and may even scale up the acid piping.

Moisture Causes Difficulty

Sulphur is not subject to as many variations as limestone, but with our particular type of equipment, the presence of any large amount of moisture will cause difficulty in the burner operation and, I firmly believe, increase the amount of sulphur tri-oxide in the burner gas. The analyses from a number of cars clearly indicate that the sulphuric acid content of the sulphur varies with the moisture.

I am an advocate of recording instruments, but they must be taken care of, checked and the results interpreted. I know that the various types of recording gas instruments have been sworn at more than sworn by, and I think that I have done my share of both. However, the fact remains that I find it pays to have one man spend a part of his time in looking after this instrument and checking it with the Orsat at least twice a day. The important feature of this checking is to let the acid makers know that the instrument is recording correctly.

A system of grading each man upon the gas run during his shift has done much to maintain not only a higher gas average, but a more regular one. The latter result comes from the ability to see exactly how the gas is running at any particular time. It can be readily shown that a strong burner gas means less sulphuric acid formation and consequent better sulphur utilization.

In addition to the acid makers being rated upon the gas analysis, the efficiency of the sulphur conversion and the regularity of the cooking acid are also recorded and graded.

The results obtained by the use of this system of grading have shown an improvement in sulphur utilization, a decrease in the amount of sulphur tri-oxide and a more regular cooking acid. All of which pay.

Cooking control includes not only the production of the best pulp possible, but the quality must not vary, the yields per digester must be as high as possible and the production maintained.

Recording pressure and temperature gauges are used on all digesters for reference, but for purposes of control the ordinary pressure gauge and mercury thermometer are used. Temperature only is plotted and made to follow a predetermined curve. The blow is controlled by the ammonia test and checked by an iodine test.

Each cook is tested for bleachability on a blow pit sample by a quick method. These cooks are then rated according to the bleach required, and charged to the man blowing them. In this way an excellent line is obtained on each man's ability. The results are made out daily and, in addition to being handed to the cooks, are plotted on a blackboard placed in a conspicuous position. In six months, by following this method of cooking control, and grading the resulting pulp, the average rating was increased from 60 per cent to 95 per cent, where it has since stayed. A brief description of the grading method may be of interest. Say a bleach of 20 per cent was desired, then pulps bleaching from about 17.5 per cent to 22.5 per cent would be graded 100 per cent; a pulp bleaching 23 per cent, 98 per cent; one 30 per cent, about 50 per cent; one 15 per cent, about 92 per cent. Due to sampling and analytical errors, it has been found that this method of approximating bleach is not closer than 2 per cent.

Bleach Test Important

The pulp is graded for color by comparison with standards and dirt counts made upon hand-made samples. For purposes of operation and reference, these determinations are valuable. Even if used only for reference, they are well worth while. Personally I would not want to run the mill and attempt to produce a certain grade of pulp without the bleach test.

By following a temperature curve, it is possible to complete the cooks at regular intervals and to space them properly. Proper staggering of cooks in itself will reduce sulphur consumption, giving a more even supply of gas to the reclaiming system and has a tendency to improve boiler evaporation through more even steam demand.

The yield of pulp per digester depends upon two factors, over which the operating men have control. Filling with chips as we do, a constant watch must be kept on this feature. To keep the men informed the yields are plotted from day to day where they can be readily seen. The yield depends also upon the bleachability of the pulp which goes back to cooking control. Plotting yield per digester against bleach will bring this point out very clearly; the relationship approximates a straight line. Yield, of course, will vary due to other conditions, as when keeping bleach constant we find that the soundness of the wood and the moisture content each have an effect.

Production, or the number of digesters dropped, is controlled by the regularity of cooking, which, in turn, is governed to a very large extent by the cooking acid. In addition, digester spacing is important in order that no digester be held while another is being worked. Standards for the various operations such as blowing, cooling, emptying, filling, steaming and taking acid have been set and a daily check is made covering all these items. At the end of the month a delay report is made out showing gains and losses. Out of nine digesters, one is allowed out for repairs, so only eight are effective most of the time.

As with yields, standards for production have been adopted and the results plotted on the same board.

Now as to whether this control pays. If decreased sulphur and limestone consumption pay; if even strength of acid pays; if high yields and production pay, and finally, if even pulp quality pays, then it is decidedly worth while.

Wood Room—Barking and Chipping*

BY C. K. BOYER

TWO YEARS ago the present victim of the program and publicity committee was suddenly taken from a peaceful safety engineering job and tumbled headfirst into the noisy confines of a wood room. Before twenty-four hours passed he faced the following cold facts. This wood room had to deliver daily, seven days per week, over long peak load periods, 120 cords of hemlock chips to sulphite mill and 230 cords of spruce to ground wood mill. Two continuous type barking drums and four intermittent type barking drums were available for the heavy work. Raw materials consisted of hemlock, green, seasoned, and frozen, and spruce and balsam of like conditions. Hemlock sulphite demanded clean as chips as possible while boiler house conditions demanded as dry fuel as possible.

Two years of noisy experience in such pleasant surroundings have given the writer some firmly fixed notions as to the barking or rossing of rough woods in barking drums.

Starting with one wood room operating dry on hemlock and the other operating wet on spruce and balsam, both sulphite and ground wood preparing processes are now concentrated in one wood room with two continuous drums running dry and one continuous drum running wet. Hence this paper is to set forth briefly facts for and against both dry and wet rossing, and the most significant reasons for combining best points of the two methods.

Water in a barking drum of either continuous or intermittent type increases power consumption by 20 to 25 per cent on account of the churning action thereby entailed. Water further acts as a lubricant between the bolts of wood and to-

*Paper read before the Northwestern Division of the American Pulp and Paper Mill Superintendents Association, Port Edwards, Wis., May 18 and 19.

gether with its buoying action actually slows up the barking or rossing action which is obtained by one block grinding hard against another block. Further, refuse coming from a wet operated drum is only about 10% to 15% bone dry. Such refuse, if below 17.5% bone dry will take, as our actual boiler tests have shown, huge piles of coal to dry and consume. If below 28.5% bone dry the refuse has no practical fuel value and decreases the actual operating efficiency of the boiler below that of coal. If such refuse is carried to rubbish piles, winter turns refuse cars into a solid mass of ice in a few minutes' time.

Dry barking has its weak points also. Absence of water means fine dirt ground into ends of wood, more brooming of ends, more dirt and gritty material in driving parts of drum, and hence heavier repair bills. While power for dry drums may run 25% less than for wet barking, repair bills on dry drums will increase at least 25% because of added vibration not absorbed by water cushion and from lack of water lubrication.

After two years of gradual development the best features of both wet and dry barking are now combined in our wood room with as many of the objectionable features removed as possible. Two continuous drums are operated dry, 330 to 350 cords of hemlock and spruce and balsam are handled by these drums in 23 hours operating time. The wood is ninety per cent barked in these drums with a minimum of sorting back. The wood then passes through the wet or third drum and comes out practically all barked and washed clean.

Results checked up by actual cost and production records give 30% more production by doing actual barking dry. Dry blocks actually bite each other and take off the bark by doing so. Heavy barking duty is removed from the wet drum leaving its wash water cleaner to do its laundry job instead of having this drum full of a red, slimy, greasy mess, and hence the wood is tumbled on to the sorting conveyor even more clean than all wet barking would do. Clean wood gives sorters a better chance to pick out the rot and guarantees cleaner sulphite and cleaner ground wood.

This combined method gives splendid results in condition of refuse as delivered to boilers. Refuse from dry drums now averages about 50 per cent bone dry and this makes up about 90 per cent of the material delivered to boilers. The small amount of wet refuse coming from the wet drum is now treated in a bark press, not of very efficient type either, and turned out about 30 per cent bone dry. With a more efficient press the total refuse would be delivered to the boilers around 45 to 48 per cent bone dry with minimum cost for sorting. As it is now delivered to the boilers the refuse from eight cords of hemlock is worth about one ton of coal. These figures are not theoretical, but are based upon actual boiler room operating results. Another significant fact is that the boiler room reports point to the bar burning boilers as actually delivering higher rating than those burning coal alone.

Combined System Best

From the above rather condensed data and experience the conclusion is that the combined dry and wet system of barking should be used wherever possible. Install at least two drums running in series, passing the dry barked wood through the wet drum for washing. Pass the wet refuse through some form of bark press and results will be clean wood, higher production and high fuel value in the refuse.

Another hard cold fact faced by the wood room is that of furnishing the sulphite mill with chips of even length, free as possible of oversize chips and low in sawdust. This is what most sulphite men pray for, and their prayers must be answered if cooking is to be speeded up with minimum steam production and maximum yields from each digester. Some factors in wood room production of such chips may be briefly stated.

Keep chippers in best possible condition. Place careful, trusty men in charge who will see that all bolts are tight and bearings running cool. Grind knives carefully without burning cutting edges and with care to keep knives in perfect balance. Have shims of different thicknesses down to $\frac{1}{16}$" in size so that chipper tender can keep knives set out to original distance of new knives. Set bed knives, where used, so that straight edge placed in bottom of spout will just nip cutting edge of bed knife. Adjust disc take-ups so that disc knives will clear bed knife $\frac{1}{32}$". Results are chips with clean cut fibres in place of crushed ends.

Govern speed of chipper disc to suit size of chips as determined by thickness of knives. Bolts of wood must have time to feed down between cuts or else short, uneven chips will result. With four knife disc and ¾" to ⅞" knife we have found a speed of 230 R. P. M. most satisfactory. Such a speed gives balanced results when the three factors of even length chips, maximum production and minimum quantity of chips needing crushing, are all taken into consideration. For it must be noted that sawdust results from two causes: First, insufficient time for bolts to feed down for a full length chip, and second, from chips being broken into needles by too high speed of chipper disc and from being ground into dust by violent treatment in chip crusher or rechipper.

Control flow of wood to chipper so that spout can be kept full during entire time, or at least for a period of several minutes, for every time the spout runs empty slivers are made in place of good chips. Such control requires a balanced production of the barking and chipping capacity, so that entire wood room runs as a unit. It requires further that some steps be taken to suit size of chipper spout to size of wood being chipped. This latter has been controlled in our instance by running an 88" chipper with 19" square spout side by side with an 84" chipper with a 13" square spout, permitting large wood to be fed into a large spout and the smaller wood to be fed into a small spout. The small chipper has a spout with a square bottom section and a half-round shape on top, giving the spout a better grip on the smaller bolts and hence keeping slivers down to a minimum.

Control tests taken each hour of the day show 85 per cent of chips of standard size, that is, between ½" and ⅞", with not more than 2 per cent variation over periods of several weeks. Sawdust waste checked by weight tests hover around 2¼ per cent of total wood scaled into wood room. Oversize chips run under 3 per cent, with remainder charged into sizes under ½".

This has been a brief statement of two of the wood room problems as worked out in one wood room. It has been the writer's aim to present the vital points so as to furnish a jumping off point for discussion and to further impress the paper maker who so often forgets that there is such a place as the wood room, except when the machines begin to "hay-out," that the wood preparing process which is the very beginning of wood pulp papermaking seriously needs more scientific assistance and control than the past has given it.

Board Mill Superintendents Meet

The Board division of the American Pulp and Paper Mill Superintendents' Association held a meeting at the Congress Hotel, Chicago, May 12. The novelty, the newness of this recently formed division is beginning to wear thin; yet at this their third meeting, there was evident more than ever a sincere and eager desire to learn how to make more and better board. Man talked with man. And these conversations were enriched by one strong bond which all had in common—a practical knowledge of board.

The meeting was called to order shortly past eleven A. M., at which time there were informal discussions regarding the work of the association. As luncheon was served in the Francis I room these discussions were carried to the table. Among other things it was proposed that the Board Division meet with the Michigan Division of superintendents during the early part of September.

During the afternoon, subjects were presented and discussed by experts on varying phases of the manufacture of board. Kenneth T. Kink, of E. I. DuPont de Nemours & Co., gave a thoroughly practical and helpful talk on "Use of Colors in Paper Making." Mr. King touched on many sides of this important question, his talk being largely in the form of a discussion prompted by questions asked by the superintendents. Every question was answered intelligently and at some length so that the benefit to those present was obvious.

J. O. Woodsome of J. O. Woodsome & Co., followed Mr. King with a talk on an entirely different subject, "Drying of Paper." The one point which Mr. Woodsome put the most emphasis upon was to the effect that *moisture cannot leave paper or board any faster than the surface will take it by capillary attraction.* This being the case he declared that the ideal arrangement of dryers was to start with a comparatively low temperature in the first dryers and gradually work this up to the highest point in the last few dryers. The proper temperature curve is shown on the accompanying chart.—Curve A.

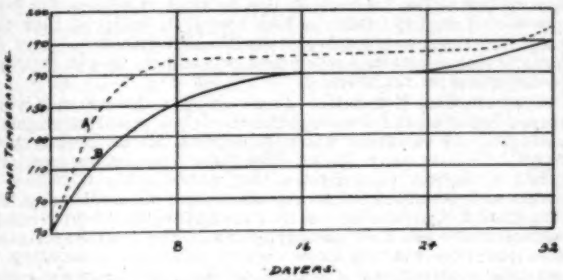
Following his general talk on the drying of paper, Mr. Galery, who presided at the meeting, asked him to describe something of his own system for drying, which he did briefly as follows:

"The Woodsome System fully recognizes that graduated temperatures on a drying machine are essential to obtain the best results, including improved quality, steam economy and increased production.

"Two very important factors in bringing about these improved results are the use of graduated temperatures on the machine and the instant and complete removal of all air and condensate from the dryers.

"Contrary to usual practice, which is to maintain a pressure in all dryers sufficient to force condensate and air through the syphon pipe and into a return header, the Woodsome System is provided with steam exhausters or ejectors, located on the return from each individual dryer, by the use of which all condensate, air and used steam are drawn from the dryers.

"Condensate, on passing through the ejectors, is reheated and regenerated into steam by the steam supplied to operate



Curve A above, charts the paper temperature through the dryers when the steam pressure in all dryers is the same. Note the rapid drying which takes place in the first few dryers. This sudden drying causes an excessive shrinkage of the paper with all of its accompanying troubles such as cockles and wet spots.

Curve B shows what is considered the ideal temperature progress in drying paper. This curve is attained by means of graduated temperatures in the dryers and is based upon the theory that paper must be dried slowly, from the center out. The two curves show plainly the economy in steam pressure attained by means of the latter system.

We believe that the above chart should be an eye-opener to paper makers who have considered the drying of paper simply an incident in the process of paper making. The above two curves should be especially significant to the man who is trying to reduce waste in his plant. And who isn't? The Paper Industry will therefore be glad to give more complete details regarding hte attainment and results of this ideal drying curve.—Editor.

the ejectors, and is discharged back into a single header for re-use in subsequent dryers, the one pipe header functioning both as a supply and as a return header.

"This single pipe header is divided into sections, the number of sections depending on both the total number of dryers in the machine and the grades of paper to be made, these sections being separated by distant controlled piston operated differential valves, which automatically maintain any desired pressure temperatures in the header sections they control."

The evening afforded a complete digression from the educational discussions of the afternoon and, gathered about a well loaded banquet table, everyone enjoyed the digression to a full extent.

Northeastern Superintendents Meet

The annual meeting of the Northeastern Division of the American Paper and Pulp Mill Superintendents Association was held at the Bangor House, Bangor, Me., on May 23. The meeting opened at 11:30 with a short business session, one of the features of which being the reading of an invitation from V. E. Fishburn, of the Groveton Paper Co., to hold the next meeting of the Division at Groveton. Assurances of plenty of facilities for this meeting were given and on motion of Nelson R. Davis it was decided to hold the early October meeting either at Lancaster, N. H., or Groveton as the committee may decide. The committee as appointed consisted of L. L. La Duke, of the Groveton Paper Co.; Walter Haley, of the Parker Young Co., and Fred Shirley, of the Eastern Manufacturing Co. Election of officers was the next business considered and the names suggested by the nominating committee were unanimously elected to office as follows: chairman Northeastern Division, Ben T. Larrabee, superintendent, sulphite mill of the S. D. Warren Co.; first vice-chairman, H. H. Hackett, superintendent, Eastern Manufacturing Co., South Brewer, Me.; second vice-chairman, K. E. Terry, power superintendent, S. D. Warren Co.; third vice-chairman, L. L. La Duke, superintendent, Groveton Paper Co.; secretary-treasurer, W. D. Sommerville, Eastern Manufacturing Co., South Brewer, Me.

Considerable discussion was aroused by a proposal that the meetings be extended in order to allow for a more detailed consideration of mill problems. It was the general consensus of opinion that this should be done, though no vote was taken. After luncheon, trips of inspection were taken through the mills of the Eastern Manufacturing Co., Penobscot Chemical Fibre Co., at Great Works, and the Orono Pulp and Paper Co., at Orono, all of which were within easy driving distance by motor from the hotel. An excellent banquet enlivened with orchestra music and songs, including solos by H. H. Hackett, Jr., son of the Eastern Manufacturing Co. superintendent, topped off the day's entertainment. Mr. Hackett it should be added ably presided over the meeting due to the unavoidable absence of B. M. Petrie, the regular chairman. Addresses included J. A. Reilly, American Writing Paper Co., on cost systems, and Walter S. Rooney, of the Albany Felt Co., on paper making in Japan, and on the construction of paper makers' felt.

Michigan Superintendents Meet

Mr. J. R. Watson, of the Watson-Gebhart Company, who appeared before the May meeting of the Michigan Division of the American Pulp and Paper Mill Superintendents, May 17, presented at that gathering one of the most valuable lectures that has been given this year. He dealt with the extremely wide and varied uses of synchronous motors, aided in his talk by correlative slides. Unfortunately a copy of his discussion is not obtainable at the time of going to press.

Mr. Watson pointed out during the course of the address the great development that this branch of power sources has undergone in the past year or two, one of the most important changes being the introduction of push-button control, thereby almost eliminating the factor of human carelessness or incapability.

"Our work for the past two years," said Mr. Watson, "has been at least eighty per cent educational. Those who were in positions to consider our proposition had first to be shown the actual working value of synchronous motors to their particular problems. Once shown what the idea could produce in their plants, however, they have been prompt to work out the details necessary to each plant with its peculiar features."

Mr. Watson then pointed out a fault that is quite common in most establishments, that of installing a power plant that is too small for the work required of it. This is usually done to conserve on expenditures. The great variance of power factor in the synchronous motor from high to low eliminates waste in a large machine doing little work, so it is an expense, the speaker stated, to install small motors.

The uses of this type of motor extend to almost all lines of manufacturing. Included in the installations during the recent past are spinning mills, clothing mills, flour mills, mines, ice plants, and water lifts. In one case of the last named use the motor, starting at almost full load, made a complete lift, from bottom of the well to a tower, of 350 feet, showing what can be done where full-load starting is required.

Following the talk Mr. Watson led a lively discussion in which the superintendents put questions to him concerning the problems of their several plants. The general impression was that the idea is one that will prove worthy of consideration from paper mill engineers in all branches.

In the absence of Mr. H. J. Gebhart, who was scheduled to meet with the men, Mr. Watson read a paper on "Condensation," which Mr. Gebhart had prepared for the occasion. In this paper Mr. Gebhart traced the principles involved in avoiding power losses by condensation in cylinders and described in detail the problems of covering the steam pipes, avoiding pockets in pipes conveying steam, and keeping down explosion risk.

The great economy in fuel appealed to the assembly, especially when it entailed no diminution of power and several affirmed that the Prosser principle is one that will inevitably come into wide use wherever steam is used for power.

In a short business meeting of the division nine men signified their intention of going to the Springfield convention.

At the annual meeting of the Sandy Hill Iron & Brass Works held at Hudson Falls, N. Y., May 1st, 1923, the following directors were elected: A. J. Kennedy, R. C. Tefft, Jr., C. W. Kellogg, H. L. Broughton, and J. M. Ferris. After the annual meeting the directors met and elected the following officers: A. J. Kennedy, president; R. C. Tefft, Jr., vice-president; J. M. Ferris, secretary-treasurer.

Cost Accountants Hold Convention

SOMETHING like sixty cost accountants, representing paper and pulp mills in the eastern, central and middle west states attended the Ninth Semi-Annual Convention of the Cost Association of the Paper Industry, held at the Cleveland Hotel, Cleveland, Ohio, May 24th and 25th, 1923. It was a rather interesting fact to recall that just seven years ago, in this same city, the first complete cost form for wrapping paper mills was adopted, which inaugurated the movement for uniform cost records among paper mills and finally resulted in the institution of the Cost Association of the Paper Industry, a few years later. One thing which particularly characterized this ninth, semi-annual convention was the splendid type of representation which attended it. Men—of the most part, young men—carrying the responsibility of cost accounting in their respective mills, and who are willing and eager to make their service to their company and the industry at large more effective, were attentive and alert throughout the entire program.

The meeting was called to order by President C. A. Jasperson who stated in his introductory remarks, as an example of the importance in which the Cost Association is becoming recognized, that at a recent meeting of the Northwestern Division of Superintendents, one superintendent who had not been known for his marked support of the cost men, suggested that the next meeting of that division be held jointly with the cost men and the technical men. Mr. Jasperson spoke of obsolescence and depreciation being big factors in cost accounting which by the stroke of a pen can be the cause of more loss or gain than a superintendent or technical man can make in a year. He said that cost men should practice what the superintendents are doing, namely, visit other mills and enlarge their understanding of methods practiced elsewhere. Following is the president's message:

The Paper Industry and Its Cost Problems

Every industry has cost problems and the pulp and paper industry is no exception to this rule. It should not be thought, however, that this industry cannot properly cope with these problems which are no more difficult than those encountered in many other industries. They too have their different groups with each its own problems and they also in these groups have a few manufacturers who scoff at those who tell them they should install proper cost accounting systems in their mills if for no other reason than that they should be fair to their competitors. Now, what is the answer to these problems in the pulp and paper industry? My subject has been designated on the program as "Paper Industry and Its Cost Problems," but I should prefer to talk about the pulp and paper industry, because the paper industry is, as we know so well, very dependent on the pulp industry; in fact, their interests are practically tied up one with the other. Let us take the pulp group first:

Pulp Group—The Cost Association has lately sent out to the pulp manufacturers throughout the United States Pulp Producer's Association (this method of reaching manufacturers being adopted at the request of that Association) six different forms relating to groundwood, sulphite and sulphate. These forms have been drawn up for the purpose of collecting statistics relating to the conversion costs and making these different kinds of pulp—the idea being to do this on a monthly basis. Our Secretary-Treasurer appeared before the members of the United States Pulp Producer's Association at their meeting at the Waldorf last April and at that time suggested that an immediate start should be made in collecting these statistics. However, the members felt that it would be better to make a start by collecting the statisics for 1922, instead of doing this on a monthly basis. The Cost Association has thus rendered the pulp manufacturers a distinct service, and if they will follow up the suggestions made feels certain that the service it will be able to render these manufacturers will prove of very great benefit to them.

Writing and Cover Group—A standard Cost estimate sheet has been drawn up and adopted by these groups and already a set of supposititious orders have been forwarded to writing paper manufacturers and estimates received thereon. A complete report has not yet been prepared from these estimates received thereon. A composite report has not yet been prepared from these estimates owing firstly, to the delay in receiving them, and secondly, to the fact that our Secretary-Treasurer has had to devote his time for some weeks past to preparing for this convention. This report will be completed, however, early in June.

Wrapping, Tissue and Book Groups—Forms have been prepared and will be submitted during this Convention to representatives of manufacturers making those different kinds of paper, for their approval. It is hoped that the forms when finally ready and distributed by the Cost Association will be approved for use by the various trade associations, as was done in the case of the Writing Paper Manufacturers Association. The forms will also be used in calling for estimates and supposititious orders and it is believed that the resulting reports compiled from the estimates received in reply to these requests will prove exceedingly useful to those co-operating in the work.

Uniform Cost Estimates—There seems to be a rather widespread belief in the industry that the Cost Association has a uniform cost estimate which it expects all its members to adopt. This is not a fact. The Cost Association has published a Budget Cost System for paper mills in which is given an outline of what the Executive Committee of the Association believes to be the fundamentals of any sound cost estimate and cost finding system. The Cost Association does not advocate nor expect every mill in the industry to use this system. As a matter of fact, it is not an entire system and would be required to be adjusted to suit various types of mills to be found throughout the country and to be considerably amplified in the case of the larger mills. This publication has proved extremely useful and already several hundreds of copies have been sold. We are now selling this publication at $5.00, and the Secretary-Treasurer tells me that orders are coming slowly but regularly for this publication which proves that there is a spreading desire in the industry for accurate information on cost matters.

Steam Costs—Owing to the necessity at this time of doing everything possible to keep down costs which are rising as we know faster than selling prices, we have arranged for two addresses to be given at this Convention on "Steam Costs," because the steam cost is one of the most costly items entering into the cost of making pulp and paper, and I believe is perhaps the one item which, speaking generally, could be more easily reduced than any other. There is undoubtedly a very great deal of misapprehension existing regarding steam facts. The two gentlemen who are to address us on this subject are both experts—one speaking from an outside public accountant standpoint and the other from an inside point of view, so that what they have to say should have a vital interest for all of us. The Cost Association is starting statistical data relating to steam costs and will ask that a committee on steam costs be appointed at this Convention. Following this we shall request the Technical Association of the Pulp and Paper Industry to co-operate with us by appointing three members to this committee to assist us by supplying any information of a technical nature which the committee may require. Forms have been drawn up for submission to this committee so that they may make an immediate start on their work which will simply be the preparation of forms to permit of the collection of statistical data relating to steam costs in such a way that it may reveal the facts quickly to mill executives regarding their steam plants and whether these plants are being run economically or otherwise.

Financial—A word before closing regarding the finances of the Cost Association. We have with us Dr. Hugh P. Baker, Executive Secretary of the American Paper and Pulp Association, who can do a great deal for the Cost Association, so I must be careful what I say in this connection. Dr. Baker, by his presence here today, lends me sufficient encouragement to say what I am going to, which is that I believe the Cost Association's dues should be collected in the same manner that the American Paper and Pulp Association's dues are now being collected, which is in accordance with the plan drawn up by the American Paper and Pulp Association last year. I well understand the reasons which, no doubt, actuated those who decided that it would be inadvisable this year to collect the Cost Association dues through the affiliated associations, yet our feeling is that what is "good for the goose, is good for the gander," and that if the American Paper and Pulp Association feels it is better to collect its own dues in this manner, it should not prevent the Cost Association from following its example. Certainly, from letters received, we find a decided objection on the part of the manufacturers to subscribe to three or four associations. Although our dues are $10.00 monthly and our work is among the most important work being done to assist manufacturers to increase their profits (which after all is the vital point), yet just this fact

that they are paying into two or three associations prevents quite a number of manufacturers from taking out membership in the Cost Association. This is unfortunate, and is a in this manner, it should not prevent the Cost Association should not be asked to compete for members with the other associations. There is another organization in no way affiliated with the American Paper and Pulp Association, owing to the fact that it has a considerable Canadian membership, which has an affiliated cost bureau. A considerable amount of money has been spent in developing this bureau, but for the line along which it is working, while peculiarly suitable to one branch of the industry, cannot be said to be the most suitable method for other branches of the industry. In view of the fact that the cost data collected is necessarily of a confidential nature it would seem to be advisable for manufacturers to carefully consider to whom they are sending such confidential information. Outside agents for big fees, are doing work which could well be done by the manufacturers own association, if the manufacturers themselves would lend the necessary support both financially and morally. One of the first things these outside agencies ask for is an undertaking on the part of the manufacturer in the group to supply the information which must be collected regularly and promptly in order that the data may be prepared in a satisfactory manner. Why cannot manufacturers give such an undertaking to their association? And why cannot they pay a little more to their association to enable it to do the work in a satisfactory manner? Even so, they would in many cases, be paying at least 50% less than they would be to the outside agency, which of course is operating for a profit. There is also to be borne in mind the fact that the information sent is of the most confidential nature and one would imagine that the only place for such information to be sent would be to the association to which the manufacturer belongs.

General—The message I have to bring as regards the educational cost work being done in the industry is the most hopeful one the Association has had to give at any of its conventions. In every group in the industry there is a demand for more information about cost matters. Our Secretary-Treasurer tells me that he has a great many more inquiries now than he had when he first joined the Association, about two and one-half years ago. Manufacturers are beginning to realize that the work the Cost Association is doing is vital to their interests and that they must endeavor to obtain correct costs if they are to carry on successfully. Although business is better than it was, great care has been taken not to permit a runaway market. Therefore, the margin between cost and sales prices is as narrow as ever. The only way, seemingly, that it can be enlarged is by reducing costs rather than by increasing selling prices. It is for the Cost Association to do everything possible to assist manufacturers in their efforts to this end and we believe that a great deal can be done in this connection which should prove of increasing benefit to the pulp and paper manufacturers of this country.

Secretary Burke Reports Progress

Secretary-Treasurer Thomas J. Burke gave an extemporaneous report of the recent activities of the Association, and stated that renewed interest in cost work among the mills is shown by the manner in which they co-operate and readily respond to his inquiries. Replies are treble what they were when he started the work. Standard forms of cost estimates, balance sheets and other records are necessary, but to correct the impression on the part of some executives that uniform cost systems might be expensive owing to the necessity of having to change over systems in some mills which are already in operation, stress should be laid on the importance, not so much that they be uniform but correct, and therefore correct methods should be talked and uniformity will take care of itself. Several tentative forms were exhibited for discussion and suggestions. Mr. Burke spoke of the importance at present of determining steam and labor costs. The former is probably the most important item before the mills today, since not less than fifty per cent of the conversion cost of making paper is represented in steam, and less is actually known about it than any other item in cost accounting.

Dr. Baker Addresses Meeting

The presence of Dr. Hugh P. Baker, secretary-treasurer of the American Paper and Pulp Association, was considered very helpful and beneficial. He gave an interesting account of some of the phases of the industry in Europe as he found them last summer, on his visit there. One thing which impressed him deeply was their method of preparing for demands on their industry during periods of depression. The Scandinavian countries felt the depression which had fallen on us last year, but instead of letting down on their efforts until a more prosperous time could afford them to proceed, they increased their general educational work and strengthened their technical department instead of scrapping it. They consider this work most important, and very likely if we had felt the depression more than we did, we would have strengthened our own technical activities for what they can do for the industry. Dr. Baker remarked that conditions in our industry are coming about, whereby it will become more easy to finance our association activities. The growing trend of opinion is that sooner or later the whole industry with its different trade activities will come together as one American industry. He then read a highly educational paper on the fundamentals in the paper industry, and concluded by calling attention to the problems which beset the industry in the matter of meeting foreign competition, which is becoming more and more acute as the source of supply in this country diminishes.

Alvin P. Simonds Talks on Economics

The morning session closed with an address by Alvin P. Simonds, president of the Simonds Manufacturing Company, Pittsburgh, Pa., on the subject of Economics for Executives, which to say the least created some hard thinking and a wish that we were a little more brushed up on the theory of business. There will be many, no doubt, who will secure for themselves a copy of Adam Smith's "Wealth of Nations," written in 1776, and devote the hour a day to its reading and study as recommended by Mr. Simonds. His convincing logic made it difficult to question his reason for such a conservative attitude toward the business future, expressed in his present action of selling business short, cutting down on additions and accepting orders only for immediate delivery. This, however, seemed to be accepted in the minds of his audience that believing such an attitude if generally assumed would be delineated in a lack of confidence upon the face of the nation's prosperity, nevertheless such opinions are most worthy of consideration and tend to stabilize our thought and action. Anyone wishing a card showing a list of books on the subject of economics can secure one by addressing their application to Mr. Simonds.

Three Strong Addresses for the Afternoon

The afternoon session was opened with a conversational talk on "Financial Statements and Their Analysis for Executives," by Mr. Alexander Wall, secretary of Robert Morris Associates, Lansdowne, Pa. Mr. Wall related the history and development of the bank credit system and how loans are obtained on the basis of the current ratio of 2 to 1, or two assets to one liability. This relation being quantitative and not qualitative, a service is offered by Mr. Wall which entails the filling out of certain forms which he will analyze and submit a set of eight ratios, such as Sales: Receivables, Net Worth: Sales, Fixed Assets: Sales, Inventory: Sales, Current Assets: Current Liabilities, Capital Invested: Loans, Capital Invested: Inventory and Fixed Assets: Current Assets. The forms will be sent out by Secretary Burke and it is hoped that the manufacturers will avail themselves of the opportunity offered.

In the absence of Mr. George E. Frazer, of Frazer & Torbet, Chicago, who was to speak on the "Proper Use of Estimates in Cost Accounting," Prof. C. C. Arbuthnot, head of the Department of Economics, Western Reserve University, gave an instructive, illustrated talk on Business Cycles. He showed the curve up and below the horizontal line, stating of course that there is no even line of business. He explained the nature of the stimulants which elevate business to a correct height and then the psychological effect that keeps it going up indefinitely, and those which force it down and the consequent psychological exaggeration which throws it down still farther. If business could be properly analyzed, he said, the going beyond the levels of good business and bad business would be prevented.

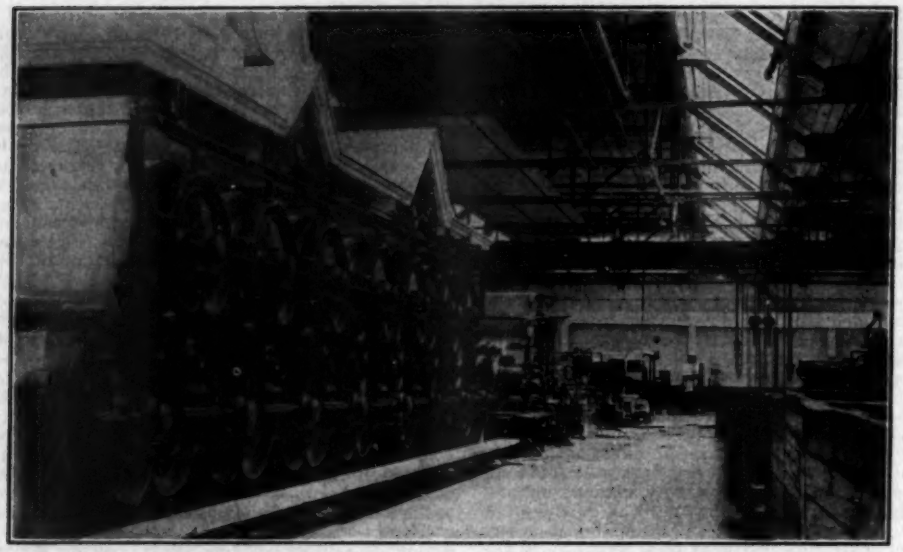
The afternoon session was concluded with an intimate and conversational discussion on Federal tax problems that particularly affect the paper industry, led by C. Oliver Wellington, C. P. A., of Scovell-Wellington & Co.

Friday's Session

A good part of the second morning's session was given over to the discussion of questions regarding activities carried on by the Association. This was followed by two very excellent addresses on steam costs. The first was by Mr. S. H. Childs, B. S., Chem. E., of Scovell-Wellington & Co., entitled "Executive Control Over Steam Costs," being a masterful presentation of the subject from an outside accountant's viewpoint, and the second by Mr. E. P. Gleason, Chief Engineer of the Nekoosa-Edwards Paper Co., Nekoosa, Wis., entitled "How We Control Steam Costs," which is published elsewhere in this issue.

Next Meeting Place Decided

After considerable discussion, it was decided to hold the



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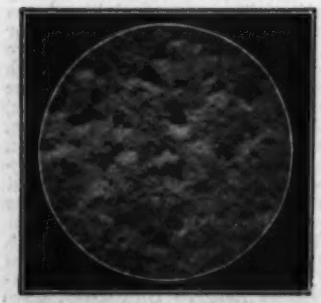
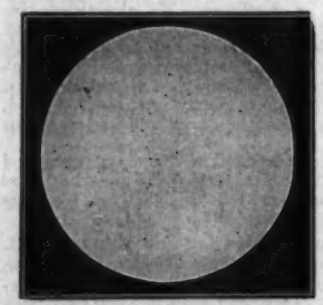


A high-grade flat finish paint photographed through a microscope



Photograph of Barreled Sunlight magnified to same degree

"Looks nice and bright now," a manager admitted, surveying the new white paint on the interior of his plant. "But it won't take it long to look dirty and gray again. Then we'll spend some more money on repainting! I don't suppose it can be avoided."

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They are using a white paint with a unique surface—*a surface so smooth that it resists the finest particles of dust and dirt.*

This paint is Barreled Sunlight—the Rice Process White.

Notice in the illustration at the left how smooth the surface of Barreled Sunlight is *even when seen through a powerful microscope!* Compare this with the surface of the high grade flat or "egg-shell" finish paint—smooth enough to the naked eye, but actually *rough and porous* when seen through this lens.

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next convention during the month of October in Philadelphia. A committee of five members, consisting of James A. Reilly, American Writing Paper Co., Chairman, S. Byron of Hammermill Paper Co., P. Koenig of Continental Paper Bag Co., H. C. Bradford of Rex Paper Co., and E. J. Fitzgerald of Scott Paper Co., were appointed to make all necessary arrangements.

Friday afternoon was devoted largely to separate meetings of the following groups: Writing and Cover, chairman, James A. Reilly; Tissue, chairman, E. J. Fitzgerald; Wrapping, chairman, P. Koenig; Book, chairman, H. C. Bradford; Pulp, chairman, A. H. Deyo.

Partial List of Attendants

Prof. Arbothnot, Western Reserve University; Dr. Hugh P. Baker, Sec.-Treas. A. P. P. A., New York City; G. E. Bellinger, DeGrasse Paper Co., Pyrites, N. Y.; Mr. Boston, Stevens & Thompson Paper Co., Middle Falls, N. Y.; Harry C. Bradford, Rex Paper Co., Kalamazoo, Mich.; W. F. Bromley, Hammermill Paper Co., Erie, Pa.; F. L. Brown, Michigan Paper Co., Plainwell, Mich.; Thos. J. Burke, Sec.-Treas., Cost Association of the Paper Industry; S. Byron, Hammermill Paper Co., Erie, Pa.; L. M. Cameron, Cornell Wood Products Co., Cornell, Wis.; Geo. W. Carr, Hammermill Paper Co., Erie, Pa.; H. A. Castle, Racquette River Paper Co., Potsdam, N. Y.; Mr. Childs, Scovell-Wellington Co., Boston, Mass.; J. V. Class, Adams Bag Co., Chagrin Falls, O.; H. Dewey, Lee Paper Co., Vicksburg, Mich.; H. Deyo, Nekoosa-Edwards Paper Co., Port Edwards, Wis.; M. C. Dickoff, Marinette & Menominee Paper Co., Menominee, Mich.; Mr. Dousen, A. W. P. Co., Holyoke, Mass.; A. Scott Dowd, Editor, The Paper Industry, Chicago; Mr. Dutcher, Strathmore Paper Co., Mittineague, Mass.; E. J. Fitzgerald, Scott Paper Co.; Mr. Fitzgerald, Strathmore Paper Co., Mittineague, Mass.; Mr. Gleason, Nekoosa-Edwards Paper Co., Pt. Edwards, Wis.; M. A. Hart, MacSimBar Paper Co., Otsego, Mich.; F. C. Hawk, Tarentum Paper Mills, Tarentum, Pa.; Wm. W. Howe, A. & W. M. Crane Co., Dalton, Mass.; J. J. Hubka, Newton Falls Paper Co., Newton Falls, N. Y.; S. A. Hummer, York Haven Paper Co., York Haven, Pa.; Pres. C. A. Jasperson, Nekoosa-Edwards Paper Co., Port Edwards, Wis.; A. H. King, Crocker McElwain Co., Holyoke, Mass.; J. H. Kline, York Haven Paper Co., York Haven, Pa.; P. Koenig, Continental Paper & Bag Mills, York Haven, Pa.; E. A. Lindberg, Northern Paper Mills, Green Bay, Wis.; J. H. Lingenfelter, Brownville Paper Co., Brownville, N. Y.; R. E. Liptrott, Interlake Tissue Mills, Merritton, Ontario; G. E. Madden, Mead Pulp & Paper Co., Chillicothe, O.; G. Miller, Cornell Wood Products Co., Cornell, Wis.; C. F. Niederman, Beckett Paper Co., Hamilton, O.; T. W. Peck, Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.; Jas. A. Reilly, A. W. P. Co., Holyoke, Mass.; F. H. Roorbach, Harman Paper Co., and Warren Parchment Mills, Brownville, N. Y.; H. R. Serf, Smidth & Ault, York, Pa.; D. C. Shaw, Tarentum Mills, Tarentum, Pa.; Mr. Shemanski, Whiting Plover Paper Co., Stevens Point, Wis.; R. H. Stagemyer, Penn Fibreboard Corp., York, Pa.; A. M. Van Douser, Marathon Paper Mills, Rothschild, Wis.; L. R. Wagner, MacSimBar Paper Co., Otsego, Mich.; C. Oliver Wellington, Scovell-Welling Co., Boston, Mass.

Fundamentals in the Paper Industry*

BY HUGH P. BAKER

Executive Sec. American Paper and Pulp Association

Certain mechanical factors are fundamental, of course, to the satisfactory production and sales of any given product. There must be raw materials of the right character, in reasonable amounts and reasonably available. There must be sound and economic methods of manufacturing, and there must be effective marketing and finally, last but not least, sound financing. These factors are, in a sense, of a character that can be worked out mathematically and by a man or men of experience and training familiar with the manufacturing processes and the sale of a product.

As fundamental as are the mechanical factors in the successful production of a given product, who is there to dispute that with the most perfect mechanical factors there will not be success unless the human elements involved are of the right character and applied in such way as to make for reasonably harmonious relations among executives, with the workers, and with those through whom the product is sold, and eventually with the ultimate consumer.

Any attempt at a careful analysis of the serious problems which are confronting industry today in this country—and the paper industry is no exception—will show that the human

*Address presented before the Cost Association of the Paper Industry in Cleveland, May 24.

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factors and human relations are the problems which are giving our executives the most serious concern and upon which, after all the most serious work is being done, that there may be a reasonably satisfactory solution. How often failure has come in a mill, where there would appear to be the most perfect mechanical arrangements, because of poor judgment in selecting human directing agencies, or because there have been antagonistic and unsatisfactory human relations, either between those directing the undertaking or between the executives and labor. We have but to stop and think of the men with whom we have worked in years past. These men may have had unusual experience or training, and yet there has been failure because of inability to get along with other men, or rather to work in such a way as to make their efforts combine satisfactorily with the efforts of others.

The forward-looking executives of the paper industry have appreciated and understood the importance of human relations, and some of them have accomplished results which may not be particularly apparent today, but it is not without reason to expect that their organizations will succeed more effectively as time passes than mills where the problem of the human factors has not been given the important place it must have.

Owing to the fact that the paper industry, as it began its present great development in this country 25 or 50 years ago, had to give little concern to the question of raw materials, there has been a surprisingly persistent feeling that the question of raw materials is not the big question in the paper industry. Naturally, with my training and experience, when I came into the paper industry I began at once emphasizing the necessity for considering the future of our forests, which are the source of a very large percentage of the raw materials used in the manufacture of paper. There has been no difficulty in arousing interest in this question among those who are manufacturing pulp, or who use pulp in very large quantities.

Even though some manufacturers of our fine papers use very large quantities of wood pulp they are loath to recognize the fact that only as we solve satisfactorily the problem of maintaining a supply of wood for pulp will we make the paper industry a permanent industry in this country. Quite a number of manufacturers of fine paper, and it is easy to appreciate their attitude, feel that they will be losers in the public estimate of the character of their product if they acknowledge too freely the part which wood-pulp plays in the manufacture of their product. This feeling on the part of certain fine paper manufacturers, that they would rather keep entirely quiet as to the amount of wood-pulp they use, is not understood in Europe where there has ben a very frank recognition of just the part which both pulp and rags play in the manufacture of paper.

As every period of five years passes there is less wood in the country than in the previous five years. There is every reason to believe that prices of wood and pulp will advance gradually, if not rapidly, and it is probable therefore that the recognition of the part which wood plays in the paper industry will take care of itself. However, the tendency to gamble on the supply of raw materials is a tendency which must be overcome. There must be a clearer recognition of the fact that we are facing a period of lean years, and that we have got to adapt ourselves as an industry to gradual changing conditions in the way of bringing of wood and pulp greater distances, and the increasing costs of these materials.

While the wood going into the seven million tons of paper which we are producing annually is at present of a satisfactory nature, and while in amount it is less than 5 per cent of the total wood cut in the United States, and about 7 per cent of the total lumber cut, yet in view of the fact that we are cutting forests in this country nearly four times as fast as they are growing, should cause us to stop, look and listen, and work more aggressively and in a more unified way for changes that will insure a permanent supply of wood upon which we may build a permanent industry.

The immediate steps necessary in the solution of a permanent supply of wood for the paper industry are rather easily seen though possibly not so easily taken. The industries of the country dependent upon wood, and the public generally, interested in the preservation of the forest, must come together in support of aggressive action in cutting down the danger from forest fires. If the lumber, the furniture, and the paper industries, would come together as a unit and demand that the Federal Government co-operate more effectively in the way of funds, especially with the states in which they are still considerable bodies of timber, in bringing about more effective protection of forests from fire, we could cut down the loss from fire in this country almost to a minimum.

Forest Tax Not Fair

The second step necessary is, again, organized effort to bring about a change in the way in which forests are taxed.

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"Yes, sir—Crescents are mighty easy on belting; easy on **me**, too, they give me a chance to do productive work, instead of chasing breaking belt-joints all day."

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We cannot go on taxing the forest crop annually and expect owners of forests to hold these forests for any length of time. Forests must be taxed on the basis of a yield tax. That is, the land must be taxed as land only and then as the forest is cut a tax should be placed upon the crop. The wrong method of taxing forest land, which we have used for so long in this country, has caused the destruction of more standing timber than has been used in the furniture industry of the country.

Along with more effective protection of the forests from fire, and a more sensible form of taxation, there must be carried on constantly sound educational work that will bring the people as a whole to the recognition of the necessity of protecting the remaining forests, and increasing returns from all forest land whether now covered with a productive forest or not. There must be a certain amount of artificial reforestation carried on in the northeastern states and in the north central states. Protection from fire will allow of the natural reforestation of great areas of forest land. There are, however, very considerable areas of forest land which will not come back to the right form of forest even if protected from fire. With pulpwood costing from $14 to $18 a cord, and in some cases more, we are at the beginning of the economic development of forestry in this country. We can now afford to grow trees as a forest crop.

There is every reason to believe that the other raw materials used in the paper industry will not become less expensive as time passes. It is probable that the level of wages will rise steadily in the decades immediately ahead. If this is so, then rags and every other raw material used in the paper industry will cost more. As far as rags are concerned, there is little that can be done to change the present situation either in the way of developing more economical methods of gathering the rags or in actual use.

Coal is of vital importance to the paper mills of the country. It is very difficult to say what may be expected in the months ahead in the way of available coal or as to prices of coal. It seems safe to assume that before winter comes again coal may be more difficult to secure, and paper manufacturers should protect themselves with reasonable purchases of coal at the present time. Coal may be cheaper next year, and again more expensive the year following. There is every reason to believe that economic conditions as affecting the coal industry will force the paper industry as a whole to turn to the development of water power and to a more economical use of steam, as well as to a greater use of electricity.

Every one of the service associations affiliated with the American Paper and Pulp Association is concerned vitally in assisting the industry in solving the problems involved in making methods of manufacture more practical and more economical. The Technical Association, the Superintendents' Association, the Cost Association, and even the Salesmen's Association, are interested in these probelms of manufacture and can help in their solution for the industry.

Owing to the rather indefinable feeling of lack of permanency in the paper industry in this country, which is bound to be present in any industry in which as little attention has been paid to the permanency of raw materials as in the paper industry, there is certain to be a holding back in the way of adopting economies and up-to-date methods of manufacture, than where permanency is a recognized and assured factor. There are rather too many mills in the paper industry, as it is organized today in America, which can be run advantageously only in times of very great prosperity. Time will, of course, eliminate such mills, or force complete reorganization and rebuilding. But reorganization and rebuilding will come only with assurance of continuation of moderate priced raw materials and a satisfactory market.

The effort which the Technical Association is making to cut down waste in the paper industry is a very worth while move in association activity. Whenever that Association can make practical suggestions as to eliminating waste it will mean dollars and cents to the industry and will be accepted as evidence of moneys well spent for association work. Along this same line, the Cost Association is in position to do some exceedingly constructive work. It can work advantageously with the Technical Association and with other associations in eliminating waste. In other words, no mill can carry on manufacturing in a sound and economic way unless it understands its costs thoroughly and applies this understanding of costs in a way that will let it compete with other mills on the right basis. Any mill that does not have a practical cost system and does not know what its various activities cost is not manufacturing in a sound and economic way, and to that extent is harmful to the entire industry.

Mechanical Improvements Depend on Future Supply

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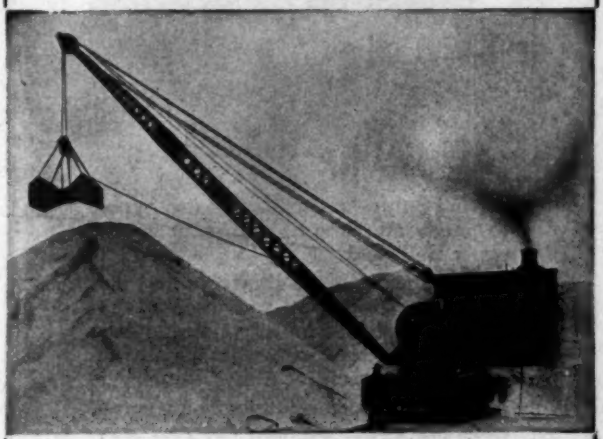

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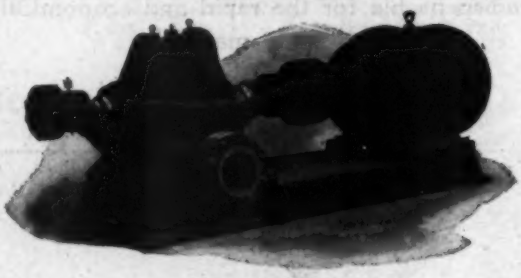

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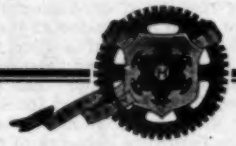

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Sectional view, Fig. 370, screwed, Jenkins Standard Bronze Gate Valve.

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more effective basis. There is a very great incentive for a mill thoroughly fortified with raw materials to keep itself modern in every respect. To the contrary, the mill that is not sure of the future in the way of raw materials may very readily hold back and feel that it should see what is ahead before making needed improvements. All of this leads me to say that every man who is interested vitally in the welfare and in the permanence of the industry should work to bring about conditions that will make for a permanent supply of raw materials which may be secured reasonably as compared with the cost of raw materials in other industries.

The growth of all of our industries which are dependent upon natural resources, particularly as to production and marketing, has been much the same. At first raw materials have been abundant, so abundant in fact that there was a feeling that there never would be any question as to a permanent supply. This has resulted, in some cases, in mills and factories being built without proper consideration of source of raw materials. As the industries have grown their attention has been focused upon increasing production. In the lumber industry, for instance, for many years the lumberman, with tremendous energy, sought to increase the production of lumber. He failed in many cases to solve the marketing problem along with the production problem, and while he was producing very effectively he was almost giving his lumber away. If I get the history of the paper industry correctly, there has been too much emphasis upon production in the past and too little upon effective methods of distribution of paper, with the result that constant effort and energy has been put into perfecting methods of production and the mill has then turned around and pretty nearly given paper away.

The past few years have seen many of our mills appreciate fully the necessity for a comprehensive marketing program, and they have adopted modern methods of marketing and are now meeting the marketing problem as effectively as many of the other larger industries. Still we are told by the leaders in the Salesmen's Association that methods of merchandising of paper are antiquated and there is doubtless great opportunity for improvement. Here, doubtless, is an opportunity for the Salesmen's Association with the assistance of the Cost Association to make a thorough study of the marketing of paper, to be followed by constructive suggestions that should mean much to the paper manufacturer.

With the possible tendency toward over-production generally in the paper industry, there is a very definite need that we increase both the use of papers already made and that we look thoroughly into the opportunities for developing new uses of paper. The Salesmen's Association, and every other association in the industry, should keep this matter of marketing constantly to the fore. There might well be an organized co-operative effort on the part of all associations in the industry for the purpose of making a careful analysis as to present methods of marketing, all leading to constructive suggestions—if such can be made—as to better methods of distributing paper.

The manufacture of paper generally requires a large amount of capital. It is not a simple matter to build, equip and operate a mill. It has been estimated that it costs approximately forty-five thousand dollars per ton of daily production to build the average paper mill, and to get it into operation. This does not include a supply of raw materials or a reserve. Certain people who know more about the use of paper than they do of its manufacture have talked of the building of a paper mill near Washington to manufacture paper for the government with the idea that the pulp for this mill should be produced from timber standing on national forests somewhere in the west. These people, of good intentions but ignorant as to the paper industry, assume that such a mill could be built and operated at a figure that would allow the government to buy paper at a lower price than is paid today. The experiences of some of the larger users of paper in buying and operating mills would be instructive to the people who wish the government to build mills.

This is but an example of the attitude of the public toward the problems involved in the paper industry. The public should know more thoroughly just what it means to manufacture paper of different grades for its daily use. The American Paper and Pulp Association, through its Information Service, has been trying in a modest sort of a way to tell the story, because it is convinced that less harm will come to the paper industry by these facts being known thoroughly by the public, than will come through ignorance on the part of the public.

The industry as a whole has in the past made but little effort to inform the financial interests of the country as to the character of the industry and the problems which we are fac-

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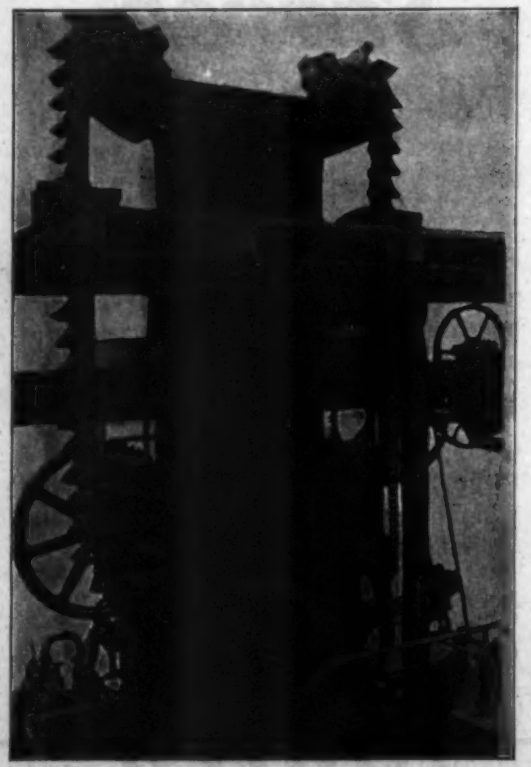

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ing. Few banks have interested themselves in the paper industry. With the development of the Federal Reserve System, and its interest in the industries of the country, there is coming now an increasing demand for information by the banks as to the paper industry. It is our feeling that the industry can profit in a large way by giving the banks, through the American Paper and Pulp Association, a reasonably complete knowledge of every factor involved in the production of paper.

So far, the paper industry has been financed in this country in a conservative and practical way. Even though the pulp and paper industry of Scandinavia is much more effectively fortified by forests than the same industry in this country, yet there has in a way been much more gambling in the industry over there, with the result that the mills of Scandinavia are apparently much more in the hands of the banks than the mills of this country. However, if the attitude of financial interest of this country is read correctly it is probable that the banking interests will come more and more into the paper industry as time passes. Again, this possible tendency toward greater control by large financial interests, which may mean either help or harm, should increase the readiness of the industry to have facts as to the industry, and facts only, given to the banks. Is it necessary to describe the part which the Cost Association and the cost men in the industry must play in this relation of the industry to the banks of the country? How can a mill be soundly financed if it does not have an effective cost system? The day is passing when the backing of individual executives in the mill, and their standing in the community, will be sufficient to carry out proper financial development. It is quite within range of reason to believe that the Cost Association could play a very important part in bringing about better understanding on the part of the banks of the country of our industry, with all of its ramifications.

Human Factor Biggest Problem in the Industry

To repeat the idea brought out at the beginning of this paper, any attempt at a thorough analysis of the problems confronting the industry will show that the human factors and human relations are the problems which are giving our executives the most serious concern. These human problems will continue to be the most serious problems which the industry will face in the next few years.

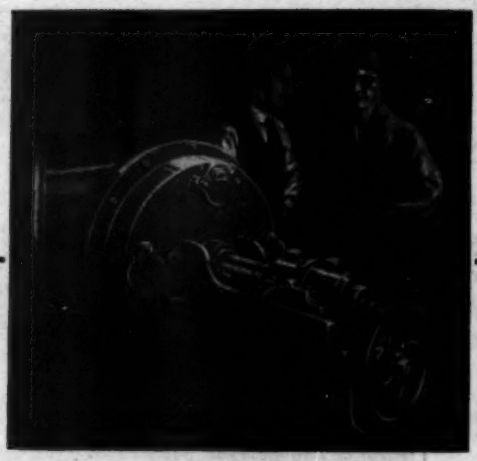
There has been a marked change in the attitude of executives generally in this country toward the part which labor plays in production. Unfortunately, this change has been in part forced upon the executives, and in part it has been the result of the leadership of men who have taken a broad view of our industrial development. The narrow attitude of certain industrial leaders in the past brought the labor unions into existence, and this older narrow attitude has made for a warfare which has been very costly and very destructive. It would be out of place, in a short paper of this kind, to discuss the general question of industrial relations in the paper industry. On the whole, with the pulp and paper mills of the country generally located in small communities, there has been a very satisfactory relation between the executive and his men, and many of the paper manufacturers of the country have taken leadership in increasing the very satisfactory and workable relations which they have with their employees.

In this connection, the paper industry, through the American Paper and Pulp Association, has been taking quite an active part in the work of the National Industrial Conference Board. This Board is a research body which has been accomplishing unusual results in the carrying out of careful studies of the problems involved in industrial relations. The work of the Conference Board has been called to the attention of paper manufacturers repeatedly and many of them have profited by results of studies by the Board.

Because of isolation of the earlier mills from large centers and from each other there developed an unusual amount of independence of thought and action among paper manufacturers. There would be a paper mill in one section of the state, another one miles away, and still another one of the same character in another state, and so on. This earlier isolation made for suspicion and lack of confidence among manufacturers.

The associations in the industry can be given great credit for bringing about acquaintanceship, understanding of common problems, and confidence among paper manufacturers. Today the manufacturers of newsprint or wrapping paper, or fine papers, are sitting down together for consideration of their common problems, and there is acquaintanceship and a real understanding of each other's problems, and a real effort is being made to assist each other in the solution of common problems.

The development of the industry in isolated sections of the



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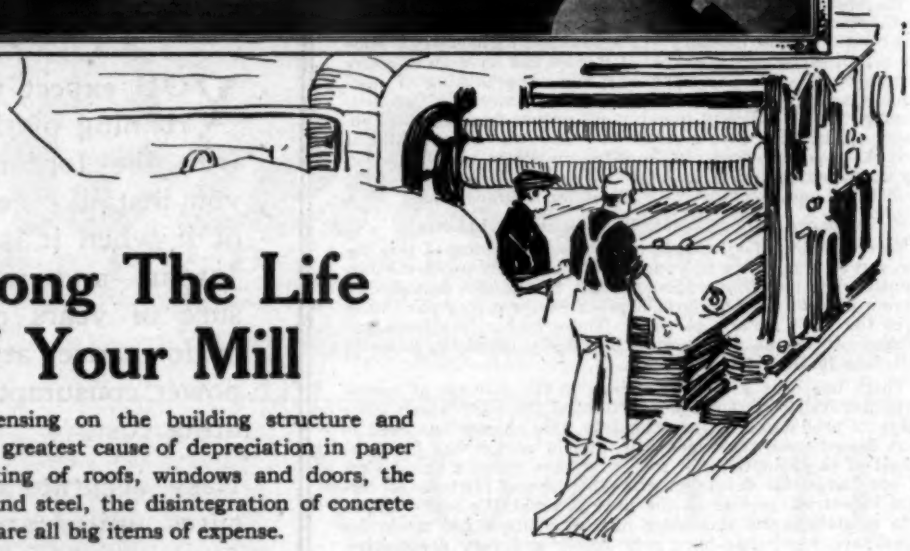

Prolong The Life of Your Mill

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country, and the gradual coming together of the different groups of the industry, has made for a group understanding of problems rather than an industrial consciousness. Just as it was necessary for the welfare of the industry to bring individuals together in groups, so it is absolutely necessary, for the continuous success of the industry, to bring the groups together as the paper industry of the United States. To meet the difficult problems ahead in the way of radical legislation, competition with foreign countries, necessity for the development of foreign trade, the solution of a common raw material problem, and the many other questions affecting the industry, there must be a common front, not a group approach and attempt at solution of these common problems. Unfortunately, it is much too common today to find that the manufacturer feels that his particular group contains all of his interests in the industry, and he cannot appreciate the desirability and the necessity of his group working with other groups. There must be a breaking down of the feeling that there is a newsprint industry, with newsprint problems only, and a book industry, with its individual problems, and its efforts to meet all of the problems of the whole industry, and there must be a bringing together of the groups to the consciousness of a great industry necessary in industrial development of America.

The great war was not won until the various allies pooled their interests and came together as a single body to meet and overcome the particular problems which confronted them. As long as one of the allies fought separately in one sector, without proper co-ordination, there was great waste along both human and mechanical lines. It took a long period of tremendously trying times to bring the allies together for unified action. There are trying times ahead for the industries, and some of them may have to go through serious experiences and wasteful periods before the groups within will see the desirability of coming together for common action.

But, there will be a greater paper industry in this country as time passes. The energy and the initiative which have proved so successful in the upbuilding of individual concerns and of groups within the industry will in time bring all of the groups together into a working unit. The bringing of the groups in the industry together for unified action does not mean changing in any way the present form of association activities, but rather a clearer recognition of the functions of the different associations and the uniting of the strength of the different groups in meeting the larger problems affecting all paper manufacturers.

The time is not far distant when there will be a larger organization of the entire paper industry, where all elements of the industry having common interests will come together for common effort in the solving of the larger problems facing the industry. It is obvious that when the paper manufacturer is prosperous, the manufacturer of paper machinery, equipment and supplies, is prosperous. So with the merchant and the larger users of paper. When the paper manufacturer is not doing good business that same condition is passed all the way down the line. While it is hard for a manufacturer, once removed from a problem, to appreciate his relation to that problem, yet that appreciation must come and will come if our associations, particularly, will work aggressively together for the upbuilding of the industry.

Modern Developments of Standard Cost Accounting*

By RALPH E. CASE

The G. Charter Harrison Associates, New York City.

YOU remember the parable of the talent? Well, the talent was quite a sum of money; in fact, the value of a gold talent, according to authorities, was the equivalent of 7200 pounds sterling or say thirty thousand dollars, and the gentleman in the parable who buried his talent in the ground and by this means tied up this large amount of capital was requested to hand it over to a more progressive business man who had trebled his own investment.

It is the business man who makes the largest profits who is the greatest benefactor to the community at large. No one could grudge Henry Ford the large profits he makes when he considered how much Ford has added to the prosperity and enjoyment of the multitude. Whatever the motives prompting the business man in his striving for profits, the chances are very much that in enriching himself he will be enriching the world in general. That this is so was appreciated by an

*An address delivered before the Connecticut Valley Local Division of the Cost Association of the Paper Industry, at Strathmore Inn, Woronoco, Mass., May 15, 1923.

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old time economist, Bishop Whately, who once made this statement—"It is curious to observe how through the wise and beneficent arrangement of Providence, men thus do the greatest service to the public when they are thinking of nothing but their own gain."

Profits are the mainspring of a business. If a business does not make profits it ultimately runs down to a point where the only kind of winding up which can be done is the kind which a receiver does!

Business enterprises being conducted with the primary purpose of making profits, it follows therefore that we must appraise all business instruments from the standpoint of the extent to which they contribute directly or indirectly to the making or safeguarding of profits and this applies to the cost system as well as everything else.

Now, of course, any cost system that is worth anything at all contributes in some measure to the making of profits, though it will be found that the cost of operating some cost systems outweighs many times the benefits derived from them.

Cost accountants are more than anxious to make their cost systems of the greatest value as profit makers but very often only have the vaguest idea as to how to proceed to realize this result.

The accounting profession is largely to blame for this state of affairs. One would imagine from reading some works on costs accounting that a cost system was an end rather than a means, and it is only rarely that the cost system is considered from the angle of profit making except incidentally, whereas, it should be obvious that the sole and only justification for any cost system is whether it helps the profit and loss statement.

Now I want to enlarge on this point a little and I am going to quote to you from a statement of a writer, who is regarded as an authority on cost accounting, to demonstrate how far off even well regarded cost experts are as regards the real functions of a cost system. According to this writer there are three primary benefits to be derived from the operation of an adequate cost system. He only mentions these three so I assume that any other benefits are regarded by him as being subsidiary and of minor importance. These three primary benefits are stated to be the following:

1. The establishment of correct selling prices which eliminate the uncertainty of whether the product is sold at a profit or loss.
2. The concentration of salesmen on sales of more profitable articles.
3. The concentration of manufacturers upon the more profitable articles.

Of course, one of the primary objects of any cost system should be to give exact information as to costs so that we can determine what the margin of profit, if any, may be on individual articles, but the suggestion which is implied by the emphasis of the other two alleged benefits—that the real secret of success lies along the line of taking the profitable business and leaving the unprofitable business to competitors—I claim to be grossly incorrect. In any event, outside of highly restricted limits, the policy is impracticable and if it were universally adopted business would degenerate into a mere cream skimming contest.

To suggest that the road to prosperity lies primarily in concentrating sales and manufacturers on abnormally profitable articles is merely to offer a temporary and superficial remedy for a deep seated trouble. Instead of calling for the solution of the basic problem as to why certain articles are unprofitable, it recommends what may appear on the surface to be a quick and easy path to prosperity. Obviously, however, if all manufacturers adopted this policy the competition for the business in the abnormally profitable lines would soon reduce the profit on these to a point where they were no longer especially remunerative.

Sometimes, of course, due to adverse economic conditions, a manufacturer is so placed that he cannot successfully compete in certain lines. In the long run, however, it must be obvious that no important item of product can consistently be sold at a price which will not net the most efficient and well placed manufacturer a good return upon his investment, and in the majority of cases it will be found that the reason for an article not being sold on a profitable basis is either inefficient selling, manufacturing, or both.

I call to mind an instance where the cost records of a client of ours showed that a certain article was being sold at a substantial loss. An investigation disclosed the fact that the price at which this article was sold was ample to provide an excellent profit, but owing to inadequate sales facilities the sales of this particular article were not sufficiently large to

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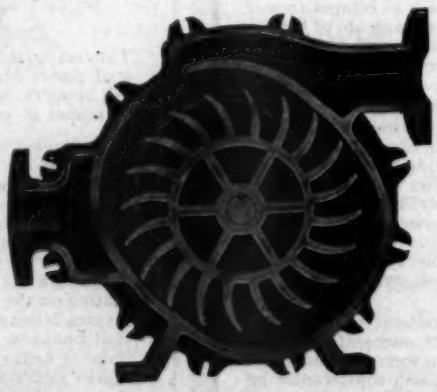

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keep the department in which it was manufactured operating at more than fifty per cent capacity with the result that more than the legitimate margin of profit was absorbed in the cost of the idle facilities. If the problem had been viewed from the restricted standpoint of the quotation I have given you, the article in question would have been withdrawn from the line and the avenue closed to what subsequently proved to be a very handsome source of income to that company.

Having determined from our cost records that certain lines of product are relatively unprofitable, the logical first step to take is to determine to what extent the lack of profits is due to causes within the control of the manufacturer. In some cases it will be found that due to various causes over which the manufacturer has little if any control, certain lines of product are not very remunerative even when efficient selling and manufacturing methods are in force, but often such lines must be retained as feeders for the more profitable lines. Unless, however, an unusual lack of foresight has been displayed in embarking upon an inevitably hopeless venture, it will generally be found that the elimination of preventable inefficiencies will result in the earning of satisfactory profits.

Cost System Should Find Lost Profits

The prime value of a cost system considered from the standpoint of aiding in the making of profits is in pointing out to the manufacturer where the profits which he should but does not make, are going. If the accountant tells him that the cashier is appropriating $100 a week from the cash box it does not take the manufacturer long to stop that particular leak, and if the cost accountant carries this principle further and shows him that he is losing several times that amount owing to preventable inefficiencies in the factory, one may rest assured that steps will be taken to repair this leak also.

The reason generally why inefficiencies are not corrected is that their existence is not known. The farmer is very much alive to the relatively trifling amount of grain he losses owing to holes in his sacks and very promptly has these repaired, but as he does not realize the far greater loss he is incurring due to the fact that his fields only produce sixty per cent of what they would if he were practicing more efficient methods of cultivation, this serious drain on his profits is allowed to run.

In order to enable the farmer to determine his loss due to inefficient methods of cultivation he requires two items of information. First, his actual production of grain per acre and, second, the possible or standard production per acre. In the same way for the manufacturer to determine to what extent his costs are excessive, it is necessary for him to know both his actual and his standard costs and a comparison of the two will tell him how much profits he has lost owing to failure to realize standards.

It seems to me that it is a self-evident truth that cost data shown without relation to standards is of little value. Standards without cost records are as ineffective as firing at a target would be if the marksmen had no means of determining whether he was making hits or not, and vice versa, cost records without standards would be equivalent to carefully recording the result of every shot but giving the marksman no definite mark at which to aim. With standards and no records we are in the position of a traveller with a time table and no watch, while conversely, with records without standards we are in the position he would be with a watch and no time table. Records without standards are a hammer without an anvil, a rifle without a cartridge.

All accounting systems which conform to established principles are what is known as double entry systems, but in a broad sense, any system of cost acounting which shows costs without relation to standards is single entry accounting—it leaves out one side of the ledger.

Mr. Harrison wrote a book in which he pointed out the glaring and serious defects of this kind of single entry cost accounting and a reviewer in the "Journal of Accountancy" pooh poohed his remarks about the failure of the accounting profession to make use of standards and stated that all accountants use standards more or less by making comparisons of current costs with the costs in previous periods. Now past results, gentlemen, are not standards. A comparison of this month's costs with those of last month means nothing unless you know the true significance of these last month's costs. Until you know how last month compared with a proper standard of attainment, just to know how this month compares with last month is information of very limited value. Agreed, of course, that the endeavor to beat a previous record is commendable and better than having no standard at all, but the procedure is vague and unsatisfactory compared with having a definite realizable standard.

The whole idea of standard costs is so much in line with

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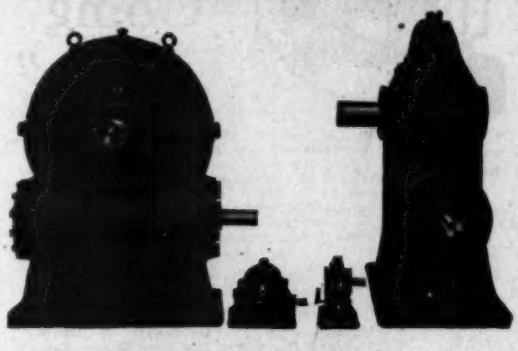

This illustration, from actual photographs of units side by side, indicates the wide range of sizes available.

FIRST COST THE ONLY COST FACTS TO CONSIDER

The Cleveland Worm Gear Speed Reduction Unit is an economy any way you look at it.

Of course, the first cost is sometimes higher than that of belting or ordianry gearing but you quickly forget that when you realize that

You don't have to baby the Cleveland to get the most out of it.

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And you get higher efficiency—greatest quietness, complete freedom from vibration, even torque and compactness with less dust raised and none absorbed, and a right angle drive.

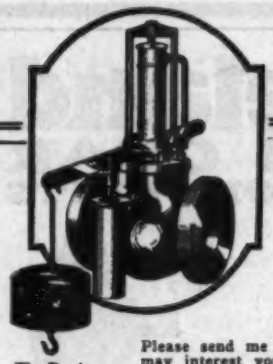
Each unit is completely enclosed and runs in a bath of oil; wear is reduced to the minimum.

We haven't said a word about the greater **safety** of our device—simply because it is perfectly obvious.

All sizes available from 1 to 400 H. P. Handles gear ratios from 3⅝ to 1 up to 100 to 1 in the single reduction types. Double reduction drives with ratios as high as 3600 to 1.

Before you decide upon any form of speed reduction, let us look over your blue prints and submit recommendations.

The Cleveland Worm & Gear Co.
America's Worm Gear Specialists
CLEVELAND, OHIO



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Chief Engineer, Hotel Huntington,
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Let us bid on your requirements

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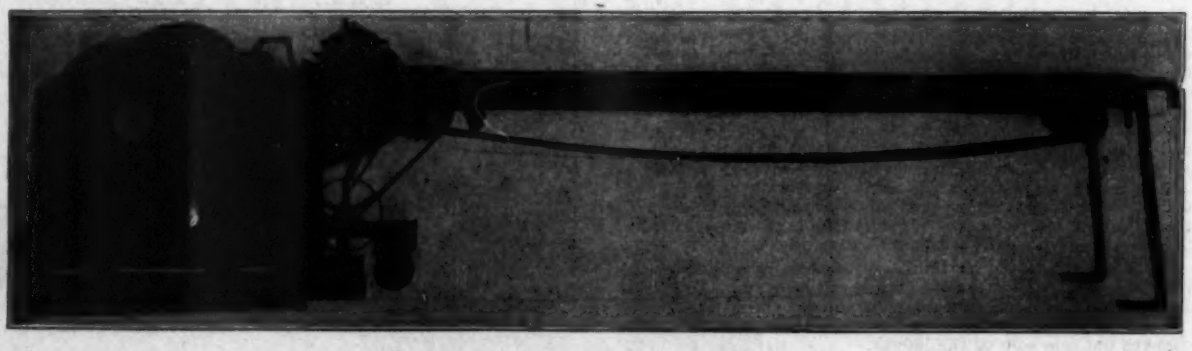

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modern industrial thought and methods that I do not think it is necessary for me to take more of your time in advancing further arguments as to the prime necessity of having some standard or ideal at which to aim and an accounting system to show to what extent our actual results have varied from standard. I will therefore devote the rest of my talk to explaining how standard cost systems are used as a means of increasing profits and some of the principles underlying their design and operation.

Now there are standard cost systems and standard cost systems—some of them, it must be admitted, are distinctly crude and ineffective. The defects in most cases have been due to the fact that the accountant did not accept the standard cost idea so that the engineer went ahead without him, and being an engineer, I speak with a certain degree of authority when I say that one lifetime is too short for a man to be both a first-class accountant and a number-one engineer. The result in many cases has been chaos. Due to the engineer's lack of accounting technique the systems he has lined up have been defective both as regards results, accuracy and cost of operation.

Cost Systems Bring Information to a Focus

Mere comparisons of actual and standard costs by operations will not get us very far but will probably cost us a lot of money. Consider for a moment, the inadequacy of this information in the kind of business with which we are most familiar where thousands of different articles are being made in the month and tens of thousand operations are being performed. Here we have schedules of cost comparisons with literally thousands of figures on them. We have called that kind of accounting Astigmatic Accounting (astigmatism, as you know, is a visual defect to an uneven surface of the eyeball, which renders it impossible for the individual to bring things to a focus.) No cost system in any way approaches adequacy which will not bring information to a focus so that the executive can be given a bird's-eye view of the situation. The late John H. Patterson of cash register fame, would not look at a statement which had more than a few figures on it, and personally, I am in accord with his ideas in the matter.

It should be possible and is possible under a properly designed cost system for the essential information relative to the cost system to be expressed on a postcard, and even then the figures do not have to be made unduly small.

Let us get to the heart of the matter and determine what is the kind of information which the executive needs in order to enable him to make money out of his cost system. George Horace Lorimer expressed the basic idea in this matter in his "Letters from a Self-Made Merchant to His Son," when he said:

"In the first place you don't have to bother very much about the things which are going all right except to try and make them go a little better, but you want to spend your time smelling out the things that are going all wrong and laboring with them till you've persuaded them to lead a better life. For this reason one of the most important duties of your job is to keep track of anything that's out of the usual. If anything unusually good happens there's an unusually good man behind it, and he ought to be earmarked for promotion, and if anything unusually bad happens there's apt to be an unusually bad man behind that and he's a candidate for a job with another house."

Now what George Horace Lorimer is describing in the quotation I have just read you is the application in industrial life of the principle of exceptions, that is, the concentration of attention to the abnormal and unfavorable condition and the spending of no more time on the normal than is necessary to establish the fact that it is normal. If we desire to eliminate the shocking loss of time of industrial leaders due to the lack of focus in accounting statements with which they are furnished, it is necessary that the principle of exceptions be applied to cost accounting methods and this involves not only making comparisons of actual and standard costs but also the summarizing of these comparisons in such a manner as will bring the data to a focus so that the executive can immediately place his finger on those conditions which call for remedying.

Now under the methods which we employ the manufacturer gets what we call a Semaphore Statement. This shows his total manufacturing costs for the month compared with the total standard costs of the month's production. An increase of actual over standard is written in red. This increase or decrease (it is generally a red figure naturally) is then analyzed by causes, some of the causes being the following:

Idle Time Expense Due Lack of Orders.

Idle Time Expense Due to Operating Inefficiencies, Lack of Material, etc.

Variations in Labor Efficiency.

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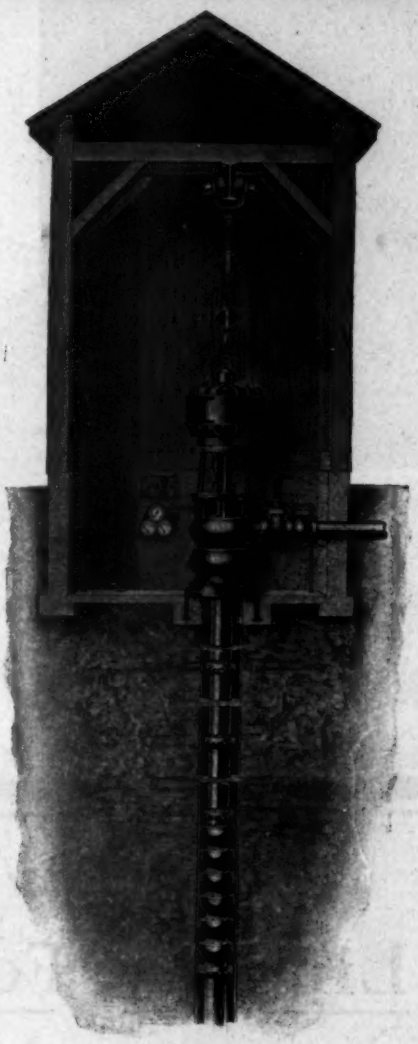

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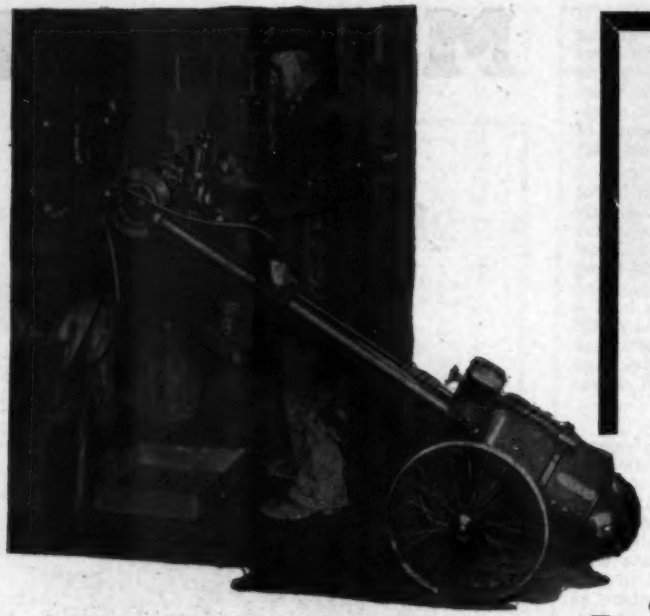

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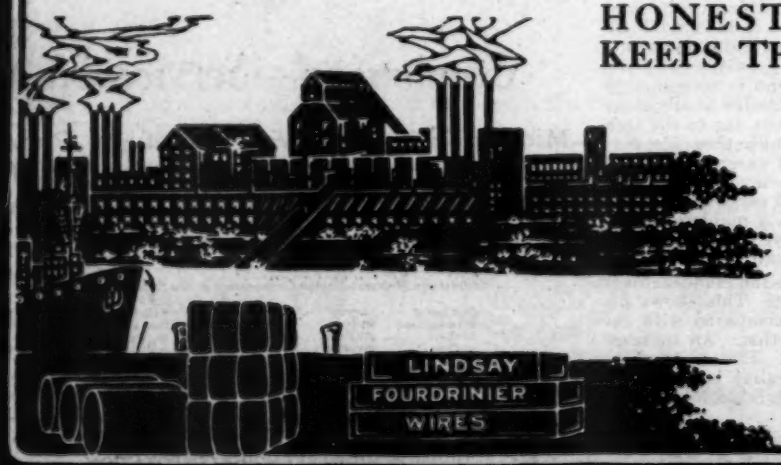

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Variations in the Price of Operating Supplies.

Variations in the Efficiency of Use of Materials.

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You will readily realize why we call this statement a semaphore because it obviously fills the same function for the executive that the railroad semaphore does for the engineer on the locomotive. In one case a red light indicates danger and in the other case a red figure indicates an unfavorable condition.

Supporting the summarized statement are detailed departmental efficiency statements which provide the executive with the fullest details of the inefficiencies disclosed in total on the summarized statement. The important feature to consider as regards these subsidiary statements is that they are not thrust on the executive until he wants them. All details are available when wanted but the plan is to give the executive his bird's-eye view of the situation and if he wants a close up picture he can have it. Otherwise he is in danger of not being able to see the forest because of the trees.

In my experience I have found that the average plant executive's greatest handicap in his efforts toward obtaining increased efficiency is in knowing where to start. The average cost system does not tell him this and he is just as likely to concentrate on some inefficiency representing a hundred dollars a month and overlook one representing ten times that amount as not. To disclose an inefficiency is the first step toward correcting it. I have never found a factory manager who would stand for seeing red figures on his efficiency statements without either remedying the situation or proving conclusively that the standards which were set up were too high and not attainable.

Another advantage of the plan I have been describing is that a hard and fast line is drawn between cost increases under the control of the factory superintendent and those which are the result of general conditions or of conditions beyond his control. Due to the impossibility of interpreting it correctly, the average cost statement has resulted in much injustice to operating men who have been called down for conditions for which they were not responsible, and conversely, many an operating man has been praised for something which he had about as much to do with as the man in the moon.

Now it is not possible for me this evening to explain in detail the methods by which such statements are prepared but Mr. Harrison has covered this pretty completely in a series of articles which appeared in the "Management Engineering Magazine" in the latter part of last year. This series of articles covers 37 pages and 9 full page diagrams and I will be glad to send reprints of this entire series to any of you who will give your names and addresses to your secretary.

Simplicity

There are, however, certain features of a properly designed system of standard costs to which I would like to draw your attention. Firstly, I would like to say a few words on the subject of simplicity. There is nothing simpler than the old style detailed cost system under which we post every time card and stores requisition to cost of parts cards and then distribute the cost of the parts to the assembly cost cards, and from these to the cost sheets for the completed article. Also, there is nothing in the cost accounting line which costs more from the standpoint of results than such a system.

There are two kinds of simplicity when we consider machines or cost systems—simplicity of design and simplicity of operation. If simplicity of design were the one and only requisite in a machine we would still be using wheelbarrows for transportation, needles instead of sewing machines and typewriters, adding machines and other labor saving devices would be unknown.

Now to get the best results in cost accounting it is necessary with complex business to have a system somewhat complex in design but the complexity must end right there. The cost system of the future will be complex in design and exceedingly simple in operation; in fact, the operation of a cost system in the main should be a nearly automatic proposition. This development is in line with that of machinery. Take the use of the automatic machine—far more complex in design than the old time machine but turning out a better product in less time and with far less experienced operators.

I have talked to manufacturers who admit (and I never found a manufacturer who wouldn't admit this) that his business was about as mean and as complex a proposition as it would be possible to conceive of and who insisted and demanded that his cost system should be so exceedingly simple that he could thoroughly understand it in all of its details in

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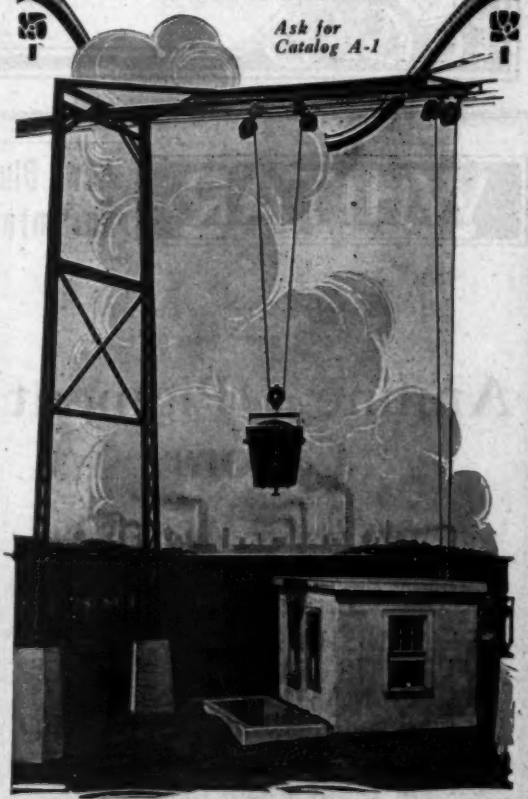

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fifteen minutes' study. And that same man will go home and experiment with the Armstrong super-regenerative receiver. If the amount of brain work which is devoted to the building of freak radio circuits were given to cost problems we would find that the quality of these would improve greatly.

Now don't misunderstand me. Simplicity is of the utmost importance and the rule should be that a system is a little complex as it is possible to get it, but if we are to sacrifice efficiency for simplicity of design then obviously we had better accept the inevitable and admit that complex business demands some complexity in system designs.

Let me try and make this point clearer. One of our problems has been the designing of a cost system for the National Cash Register which is along standard cost lines. Now the simplest way in which to get labor efficiency data would be to figure every one of our time cards at standard, but with several million time cards in a year this would be an appalling proposition. By making periodical tests or appraisals, however, of a limited number of tickets, we are able to rely upon the law of averages and apply our specific efficiency ratios to the whole payroll and do this at probably one per cent of what it would cost to carry the work out in complete detail. But obviously handling the work in this way is more complex than would be necessary if we made a fast and hard rule that every time card was priced and extended at standard.

There is another thing about complexity of design and that is that the average manufacturer doesn't know how complex his system really is. I call to mind a case where Mr. Harrison draw up plans for one of our clients for handling an important section of the work in his business and presented them. He looked them over and said, "Nothing doing, friend Harrison." Mr. Harrison was rathed surprised because he knew the proposed plan was far ahead of that being followed, so he said to him, "All right, I have drawn up an alternative plan for your consideration," and showed him a diagram with about twice as many forms on it as the other one and of course was told very emphatically that the alternative plan was worse than the one first shown him, whereupon Mr. Harrison broke the news to him gently that this second plan was the one which was then in use.

Formulas of Much Help

Now I think you will all agree with me that unless a cost system will enable the cost accountant to answer the president's way when the statements show that the actual costs are in excess of standard, it can hardly be considered as adequate. Cost accounting isn't scientific unless it does explain the causes of cost variations. To make an analysis of an increased cost by causes obviously demands a knowledge of the laws underlying cost variations. This is a difficult and complex proposition and yet in one of the most complex business for which I have had to prescribe, the complete work of analyzing cost variations is handled by one girl twenty years old who gives only a part of her time to this work. How can she do this? She does it primarily by the aid of formulas. But there are limitations to the use of formulas alone, for as Taylor stated in the "Principles of Scientific Management," "If a good mathematician who had these formulas before him were to attempt to get the proper answer (viz.; to get the correct cutting speed and feed by working in the ordinary way), it would take him from two to six hours, say to solve a single problem; far longer to solve the mathematical problem than would be taken in most cases by the workman doing the whole job on his machine."

Taylor's formulas were of limited practical value to the man in the shop until Carl Barth made use of them in his slide rules, for as Taylor stated—

"By means of this slide-rule, one of these intricate problems can be solved in less than half a minute by any good mechanic, whether he understands anything about mathematics or not, thus making available for everyday practical use the years of experimenting on the art of cutting metals. This is a good illustration of the fact that some way can always be found of making practical, everyday use of complicated scientific data, which appears beyond the experience and range of the technical training of ordinary practical men."

Now this same principle applies to the analysis of cost variations by the use of cost variation sheets. It is possible for these formulas to be effectively used by persons who haven't the faintest idea of what it is all about any more than the average girl in a cost department who uses a slide rule understands the principles of the logarithms on which this slide rule is based.

Up to now I have emphasized the fact that a properly designed standard cost system will make profits for the manufacturer by drawing his attention promptly and auto-

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Proceedings of the Annual Meeting, April, 1922.
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The volume described is obtainable, on order, from the Technical Association of the Pulp and Paper Industry, 18 East 41st Street, New York City, at $3.00 per copy.

matically to the existence of preventible wastes. A standard cost system can also save money for the manufacturer by reducing the high cost of cost accounting. One example of this is as regards the figuring of elapsed time on individual operations. In a factory manufacturing a standard product it is not necessary to use elapsed time clocks or to figure the time spent on individual operations. If we know the total time a man worked and the standard hours represented by his production during that time, we have all that is necessary for obtaining our data relative to labor efficiency and for the other purposes of a cost system such as the figuring of current costs, and cost of sales. Standard costs enable us to eliminate a great deal of clerical work both in the factory and the office, and I have known of several cases where detail costs were abandoned owing to the immense amount of clerical work involved and replaced by standard costs.

The figuring of standards is, of course, in many businesses a large undertaking but the point I want to make as regards this is that a business should have standards for all operations whether it operates a standard cost system or not. Last summer Mr. Harrison spent some weeks in England lining up a standard cost system for the Rolls-Royce people and to his surprise found that this company, which, in addition to making its famous automobile chassis, also makes aeroplane engines, had standard times figured for every operation. And note this—when any repair work was sent them they invariably figured the cost in advance and notified the owner. Perhaps this is one of the reasons why they have been able to maintain the reputation of making the best car in the world and that it was a Rolls-Royce aeroplane engine which first made the trip across the Atlantic.

Cost accounting is a complex science and it is obviously not possible for me in an address like this to more than outline certain main principles; but I believe you will find that the time you are spending in listening to me will be well repaid if you carry away one idea, namely, that one must consider a cost system like any other machine in the business—is it a profit? If it isn't, why isn't it? If the cost men here will consider their problems in this light they will increase their value to their employers and themselves. Another thought and that is that information tucked away in the files isn't of much use. Cost statements should not call for analysis—they should disclose the essential facts automatically.

It is well for us to hold before us a vision of the future so that we can gradually shape our methods to conform to advancing knowledge, and before I close I would like to give you my impression of where accounting in general is headed. These are not our views alone—we share them with the comptrollers of some of the most progressive of our large corporations. The accountant of the future will be a man of wide vision. He will spend more time in figuring what his balance sheet will be six months from now than in considering what the balance sheet at the close of last month showed. Profits as well as costs will be predetermined and each month the comptroller will submit a statement showing the actual profits in relation to standard and an analysis showing the causes contributing to the failure to realize the standard profits. This is the logical development of the cost variation statements which I have been discussing this evening. It will show to what extent potential profits failed to materialize owing to the sales quotas not having been realized. Detailed statements will be furnished analyzing these figures by territories and salesmen. In this connection I may mention that each week the National Cash Register Company prints and distributes a statement showing a comparison between the actual and standard sales for the previous week and for the year to date for approximately 2,000 salesmen, so my idea is hardly as far fetched as it may appear to some of you.

The profit variation statement will also show to what extent profits varied from estimates owing to variations from the standard prices. It will show also the variation in profits due to variances from standard selling and administration expenses, and of course to variations from the standard costs of manufacture.

It is this kind of accounting which is going to elevate the accountant to his legitimate place in the sphere of industry. He will be the mariner of the business world. He will be able to show the directors not only where the business ship is at the present but he will also chart its future course. He will, of course, require to make corrections from time to time but so does the mariner. And the result of his work will be to materially aid in bringing the business ship into the fair haven of substantial profits.

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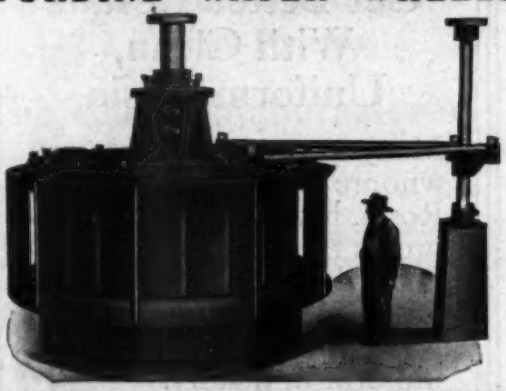
The large capacity of our three modern plants and the fact that production is, at all stages, under careful technical supervision and chemical control assure you of a dependable supply of Hercules Wood Rosin with the qualities you need for efficient work. Except for the whitest papers, it makes good sizing.

Our technical service men will gladly co-operate with you in adapting our rosin to any special requirements you may have.

HERCULES POWDER CO.
Wilmington Delaware
SALES OFFICES:
New York, N. Y. St. Louis, Mo.
Chicago, Ill. Louisville, Ky.
San Francisco, Calif. Buffalo, N. Y.
Chattanooga, Tenn. Duluth, Minn.
Birmingham, Ala.

HERCULES
Naval Stores
Produced Under Chemical Control

LEFFEL
TURBINE WATER WHEELS



HIGH SPEEDS, HIGH POWERS, HIGH EFFICIENCIES

All of our turbines are designed and built to suit location and requirements, by engineers and experts who have had years of experience in this particular line of work. Turbines fully guaranteed.

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Wooden Tanks, Tubs, and Vats

Wooden Penstocks, Acid Towers, etc.

Inbuilt strength and durability are features of all products manufactured by this company. Handy pocket size catalog mailed upon request.

Established 1893

Quality Guaranteed

The Smallwood-Low Stone Co.
Lisbon, Ohio
U. S. A.

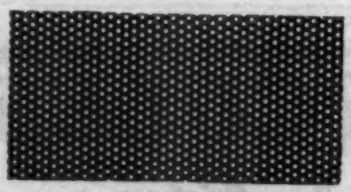
DENSIMETER—A New Instrument for Paper Mills

A shop instrument for determining the density of rubber in accordance with a standard scale. Can be used in conjunction with a plastometer as its reading multiplied by two will give the plastometer reading. This is a rugged scientific instrument designed for use in the mill as well as the laboratory, and although it was primarily designed for testing rubber rolls, it may be used for testing any other rubber articles. It is suitable for testing rubber rolls in place in the machine in which they are used.

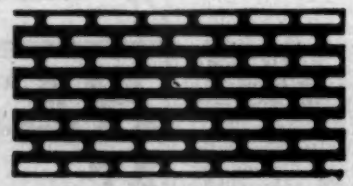
Send for Bulletin No. 124

STOWE & WOODWARD CO. The Rubber Roll Makers
Newton Upper Falls, Mass., U. S. A.

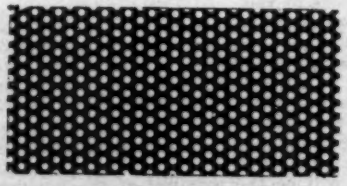
Perforated Metal Screens for Pulp and Paper Mills



.065 inch round



⅛ x ½" Slots



3/32 inch round

Steel, Copper, Brass, Bronze and other alloys punched for Centrifugal and Rotary Screens, Pulp Washers, Drainer Bottoms, Filter Plates, etc.

CHARLES MUNDT & SONS 57-65 Fairmount Avenue, Jersey City, N. J.

New England

Much Destruction in Wake of Floods

Boston, June 1, 1923.

The after effect of the floods in northern New England has been a long list of from small to large repair and replacement jobs at practically every paper mill situated along the large rivers. Among the mills that have spent much time in restoring damaged boiler rooms etc., we might mention the International Paper Co., mill at Livermore Falls, the Pejepscot Paper Co., at Brunswick and Topsham, and the Penobscot Chemical Fibre Co. at Great Works. Many mills closed for from three to ten days pending the recession of the high waters. The greatest loss was entailed in the pulpwood booms which were swept to sea or left stranded for miles along river banks. Hollingsworth & Whitney estimate their loss in the hundreds of thousands of dollars. The Advance Bag & Paper Co., and the International Paper Co., were also heavy losers. The result was immediately seen in the pulpwood market which has strengthened perceptibly to $22 per ton for spruce and fir.

A slowing up in paper mill activity is seen. It has affected principally, the fine paper mills and the board makers, with the newsprint and book paper still with abundant orders necessitating capacity production. But new orders on printing paper have not been coming in with the same rapidity as during April with two notable exceptions. There are two famous book paper mills in Maine that report May business total, one of the greatest in the history of either.

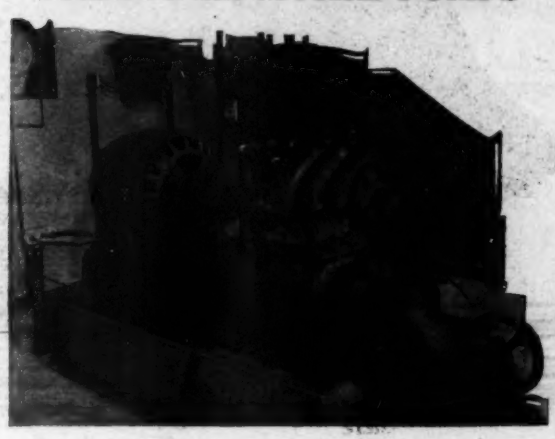
The talk of the trade insofar as mill expansion goes is confined to the great additions that are already in process at the plant of the Oxford Paper Co., at Rumford Falls, Me. A total capacity of 350 tons of book paper per diem is the aim. This latter fact should be dwelt upon. It will make Oxford indisputably the largest maker of book paper in the east and we doubt whether a western maker exceeds it in one mill. There is only one other mill in the east that produces more paper of any kind and that is the Great Northern Paper Co., at Millinocket, Me., but that is a news mill. A new 162-inch Fourdrinier is being built at Worcester by Rice, Barton & Fales, to accommodate which the mill main building at Rumford is being extended 216 by 75 feet not only to provide for the new machine and beaters but to care for future expansion. A pulpwood conveyer is also under construction and an enlargement to the bleach plant will give it 216 feet more frontage and an increased production of 1900 tons of electrolytic bleach and 75 tons of caustic. It should be added that the scale on which these additions are being built can better be appreciated when it is said that the pulpwood conveyer is to be a mile long at least consisting of a wooden trestle equipped with a traveling chain. At least $750,000 is a conservative estimate of the cost.

A patent case involving the patented cement and sand lining of pulpmill digesters has just been decided in the Federal District Court at Boston, decision favorable to the Burgess Sulphite Fibre Co., (now the Brown Co.) who were defendants. It was regarded as important although suit had originally been instigated back in 1907. The fact that the plaintiff, American Sulphite Fibre Co., owning the patent did not bring suit previously told heavily against them. The patent covered a cementitious material that was acid resistant, used to line insides of digesters. The Burgess company used a preparation impervious to acid but of entirely different composition. They also used a layor of cement, on which the plaintiff hinged his case but this was not acid resistant and was used as a setting for bricks only. The digesters in question were at Berlin, N. H., in what is now the sulphite mill of Brown Co. It is believed the case may be appealed to a higher court.

The New England Paper and Pulp Traffic Association has prepared a pulp mill map of the United States on a par in accuracy and general all round perfection with their paper mill map issued last year. It is primarily prepared for use in traffic cases but is issued to all member mills of the association and will probably be available for purchase. It shows the amount of excess pulp available at each town or city in which a mill is located. By excess is meant that available for market above the requirements of the paper mills in the town or of mills to which the pulp plant is subsidiary.

Max Hilton, of the Great Northern Paper Company, who recently returned from an extensive trip through the Scandinavian countries, makes some interesting comments on the reforestation methods adopted by those countries. In Norway, he remarks that every large timber-owner including the pulp

FAIRBANKS-MORSE PUMPS



ECONOMIZE FLOOR SPACE

The Fairbanks-Morse Three-Inch Multi-Stage centrifugal pump direct-connected to a Fairbanks-Morse slip-ring motor furnishes the city of Portland, Oregon, with 350 gallons of water per minute at a head of 350 feet doing the work of an 8 x 10 Triplex Pump and saving three-fourths of the floor space.

The horizontal split-casing centrifugal pump is the ideal installation for booster plants, on account of its high efficiency and the ease of access to parts without disturbing the pipe connections. Chemical plants, factories, hotels, mills, municipalities, office and apartment buildings find the Fairbanks-Morse centrifugal pump Economical, Reliable and Dependable.

One Manufacturer
One Responsibility

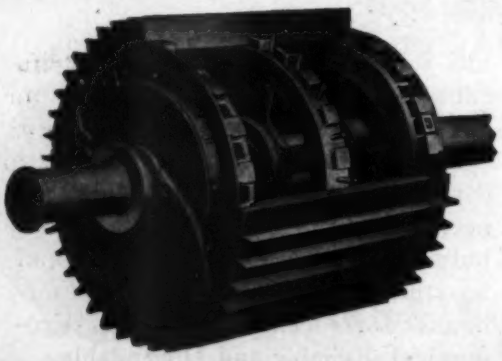
FAIRBANKS, MORSE & CO.
Manufacturers Chicago

Because there are no moving parts this is a very simple but very efficient device. Patent No. 1,271,426 issued to Mr. Brownell Buehler, July 2nd, 1918.

The Shartle Continuous Beater Company
MIDDLETOWN, OHIO

"Dayton" Beating Engines are Built for Heavy Duty

Dayton Beater and Hoist Co.
DAYTON, OHIO



Dayton Globe Iron Works
DAYTON, O.

We manufacture Beating and Washing Engines, Head Gates, Hoists and Gears.

Our Wedge Type Bandless Roll made of semi-steel with special alloy bars is practically indestructible.

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WATER
PURIFICATION SYSTEMS
SOFTENING & FILTRATION
FOR BOILER FEED AND
ALL INDUSTRIAL USES
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companies does some planting by the setting out of small plant trees. As a general average the stands of the larger concerns contained more spruce per acre than those of the Great Northern Paper Company (which are counted among the best in this country). Attempts are usually made by each company to keep all their land productive. If natural reproduction does not take place on a piece of land within a reasonable period after it is cut over the land is immediately planted.

Drastic Changes in Freight Rates

On February 28th last, the New England Freight Association gave a hearing to paper shippers of New England. The Association representing New England railroads had proposed a scheme of rate changes in paper which met with decided opposition. The shippers aired their views at this hearing. These were considered and the roads now make their report as follows: They have cancelled all less carload commodity rates on paper in New England, so that l.c.l. shipments henceforth will move on a straight 3rd class basis, a drastic advance. Carload special rates are cancelled at the same time and put on a sixth class basis in the case of blotting, cover, coated, book, wrapping, card, and bag papers. Newsprint, all sorts of paper board, roofing paper and wall paper are put on a ninety per cent of 6th class, under the so-called Anderson A scale. The carload minimum was advanced to 40,000 pounds. On the New York, New Haven & Hartford R. R., local rates were left unchanged but rates from other New England points to the New Haven R. R. were advanced to 6th.

The gathering of Strathmore Paper Co., distributors at Woronoco, Mass., on the 26th to 28th of May, for a sales conference under the auspices of the Strathmore Mill Merchants Association was as usual productive of much inspiration for the sellers. Ways and means of improving the mill and merchant service were discussed and B. A. Franklin, C. W. Dearden, and C. F. Norton in their addresses dealt with the science of selling the high class paper of this mill. It is a feature of this company's policy that has unquestionably assisted it in attaining the high position it holds in quality paper making.

The only manner in which the roads showed a disposition to be reasonable was their expressed willingness to consider individual cases where competition necessitates modification of these general rules. Drastic increases in freight bills are involved. One Maine mill will have an added yearly freight charge on their paper to Boston alone of $45,000. We doubt whether the matter will be allowed to rest here long.

P. H. Graham & Sons, of 119-123 East Dedham Street, Boston, suffered a loss by fire of their warehouse and its contents of paper stock on May 26. The loss is estimated at $50,000 with several hundred tons of waste paper and strings destroyed. The company is occupying quarters in South Boston at present with the Boston Paper Co. Only partial insurance was carried.

The Chemical Paper Manufacturing Co., of Holyoke, has increased its capital stock from $2,000,000 to $2,500,000 by the issuing of 500,000 of additional first preferred stock. The authorized capital stock will now be represented by 10,000 shares of first preferred, 5,000 of second and 10,000 of common. Expansion of the company is rumored in the near future.

A gala day is planned by the Boston Paper Trade Association on June 14, when they will hold their annual Field Day at the Hatherly Country Club, North Scituate, Mass. An honest-to-goodness shore dinner is part of the program as are sports of various kinds. The trip will be made as usual by auto.

Shipments of pulpwood from the Maritime provinces of Canada to Maine ports for shipment to Maine mills has started. Pejepscot Paper Co., International Paper Co., and Hollingsworth & Whitney Co., are among the Maine companies which import huge quantities of pulpwood from Canadian lands.

Boston financiers who are actively interested in the reorganization of the Riordan Co., Ltd., announce that progress has been made in underwriting agreements which involve material reduction of the company's total fixed charges and

MITTS & MERRILL

The Mitts & Merrill Shredder will reduce magazines, books, old paper and boxboard, frozen or dried pulp laps, roll and sheet stock in a thoroughly economical manner.

Built in sizes with spouts ranging from 18 to 45 inches wide.

We also build a 100% efficient "Hog" to reduce pulp mill bark and wood refuse.

MITTS & MERRILL
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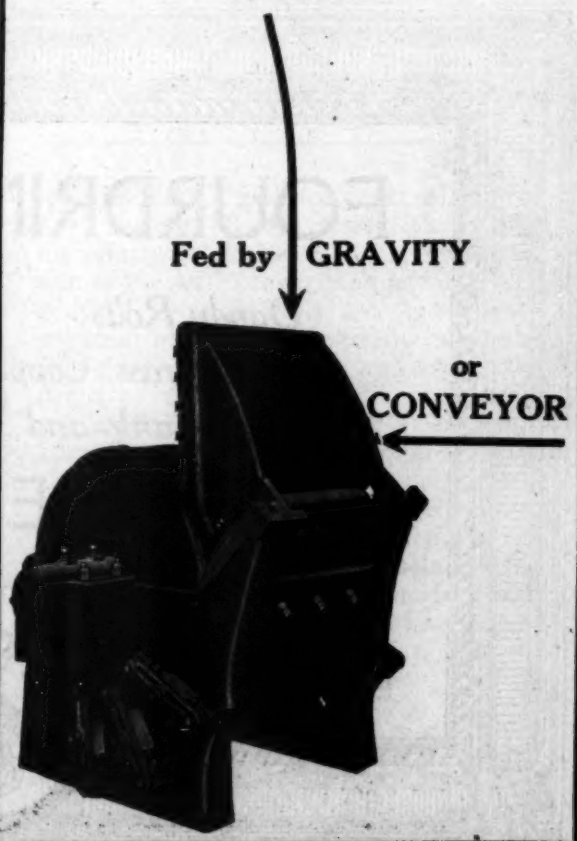
Saginaw, Mich.



NON-STOP records, whether they are made with Fourdrinier machines or airplanes, can only be attained when every mechanical part of the machine is in perfect condition.

If the Fourdrinier Wire is not equal to the strain, the speed, and the tension, if it does not run straight and true without becoming slack at the edges or baggy in the middle, long runs without shut-downs for wire replacements cannot be made.

Tyler Fourdrinier Wires, because of the tough, wear-resisting wire from which they are made and the careful weaving, handle large tonnages of paper before wearing out; they save loss in production by eliminating unnecessary shut-downs.

No matter what type of Fourdrinier machine you operate, whether regular or high-speed, there is a Tyler Fourdrinier Wire made for the requirement.

Let us send samples for your inspection.

THE W. S. TYLER COMPANY, *Cleveland, Ohio*

Manufacturers of Woven Wire Screens and Screening Equipment

FOURDRINIER WIRES

Dandy Rolls *Cylinder Molds*

Brass, Copper and Iron Cloth

Bank and Office Railings

WIRE SIGNS

Cheney Bigelow Wire Works

Established 1842 SPRINGFIELD, MASS.

indebtedness. A large amount of new working capital will be provided.

The Missisquoi Pulp and Paper Co., Sheldon Springs, Vt., one of the largest bristol board makers in the country, is adding a building to house a new paper machine. There is also to be constructed a new power house, a large concrete chimney and a few smaller developments incident to completing practically a new paper mill. Improvements will cost about $500,000.

Robert Gair Co. is planning to extend business in New England. They have opened an office at 161 Summer St., Boston, which is working in close conjunction with Haverhill and New London mills.

Kalamazoo Valley

Kalamazoo, Mich., June 1, 1923.

A recent transfer in Kalamazoo discloses the taking over of the establishment, of the Waste Paper Packing Company of Kalamazoo by the Paper Trading Company of the same city. The Real Estate, Equipment, and business of the former concern are included in the transaction. The offices of the new company will be moved to the East Frank Street building formerly used by the first named firm.

Along with this action the Paper Trading Company announces an increase in capital stock from $50,000 to $200,000. A. F. Meisterheim will continue with the company as president and general manager.

At a recent meeting of the stockholders of the Eddy Paper Company, Michigan Division, it was voted to accept 31,200 shares of no par value stock in the Eddy Paper Company of Illinois in exchange for 700,000 shares of common and 176,400 of preferred stock in the Michigan concern. A protest was entered by a minority whose holdings aggregate some $150,000 and President Charles A. Blaney, of Kalamazoo, was summoned to answer the protest in the St. Joseph County Circuit Court. T. J. Cavanaugh and James Anderson of Paw Paw are representing the minority. Harry C. Howard, Kalamazoo attorney, is handling the case for the company.

The Dependable Club of the Allied Paper Mills at its regular monthly meeting at the Hotel Burdick last week listened to talks on standardization of papers and the methods used in promoting Allied sales by Messrs. MacDonald and Proll. These gentlemen represented the Lamport-MacDonald firm of South Bend, Indiana, which handles the advertising occount of the Allied Mills. President Gilman of the club also appeared, discussing some of the problems met in the operation of plants on a large scale.

Wisconsin News

Green Bay, Wis., June 1, 1923.

The Milwaukee Lace Paper Company, the largest bon bon cup and fancy chocolate box liners manufacturers in the world, has just opened a number of new branches and is now maintaining branch offices in New York, Boston, Philadelphia, New Orleans, Chicago, Cleveland, Minneapolis, Vancouver, B. C., San Francisco, Montreal, Toronto and Calgary, all managed by Milwaukeeans.

Iron county (Mich.) will soon see the starting of reforestation on some of its large tracts of barren land, once thickly dotted with white pine and other timber. Under the direction of the county agricultural commission 6,000 white pine trees will be set out to start. Tractors will be used in the work.

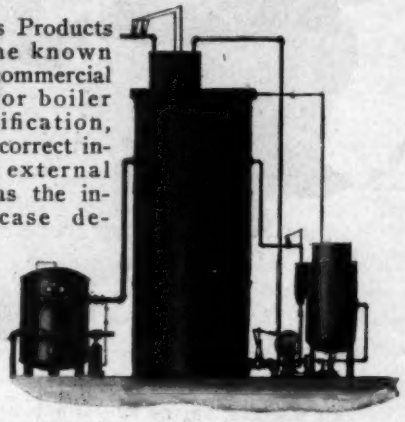
David Norberg, office manager of the Victory Bag and Paper Company, has resigned to go to California, after three years with the company here. He acted as secretary and treasurer of the Victory Welfare association. Herbert Anderson is the newly appointed secretary and treasurer of the Welfare association.

E. J. Hansen, sales manager of the Fort Howard Paper Company, is in Deaconess Hospital, Green Bay, where he underwent a major operation Wednesday. He has been incapacitated since an operation last December. He is reported on the road to recovery.

The Thilmany Pulp and Paper Company, Kaukauna, has been receiving bids on installing approximately 3,100 lineal

Water Softening and Filtration

Paige-Jones Products include the known successful commercial methods for boiler water purification, permitting correct internal or external treatment as the individual case demands.



Paige-Jones Pressure Filters insure a clean and clear water for all industrial purposes.

Write today for descriptive literature.

PAIGE & JONES CHEMICAL CO.

417 So. Dearborn St. CHICAGO

248 Fulton St. NEW YORK

New Sand Filter

A SPECIAL filter for paper mills, producing all the results the paper manufacturer desires. It is a modification of the well known Hungerford filter adapted to paper mill use. It is constructed of concrete, strictly wrought iron pipe, brass strainers and especially prepared silica sand. It is as durable and efficient as can be built at any cost. It can be sold at a very low figure.

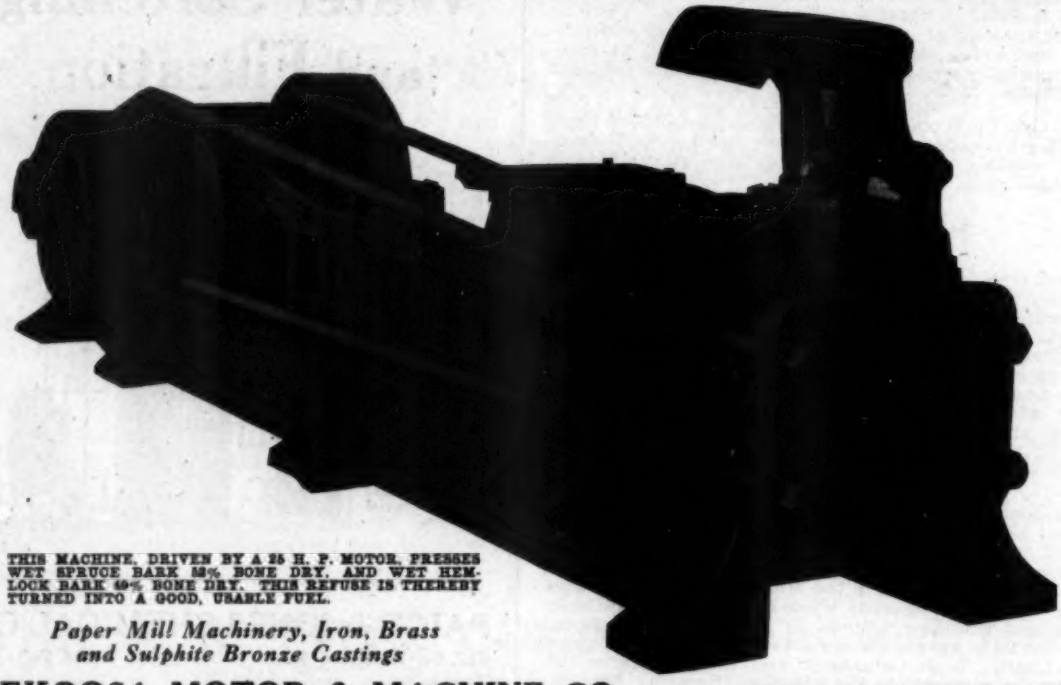
This filter gives perfectly clear water, washes thoroughly, does not require renewal of the sand bed, is absolutely reliable in the performance of its duty and requires a minimum amount of attention.

Send for full particulars

Hungerford & Terry, Inc.

CLAYTON, N. J.

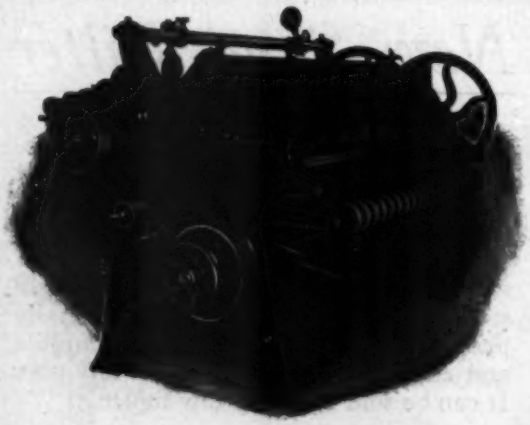
The Giant Nekoosa Bark Press



THIS MACHINE, DRIVEN BY A 25 H. P. MOTOR, PRESSES WET SPRUCE BARK 58% BONE DRY, AND WET HEMLOCK BARK 49% BONE DRY. THIS REFUSE IS THEREBY TURNED INTO A GOOD, USABLE FUEL.

Paper Mill Machinery, Iron, Brass and Sulphite Bronze Castings

NEKOOSA MOTOR & MACHINE CO. NEKOOSA, WISCONSIN



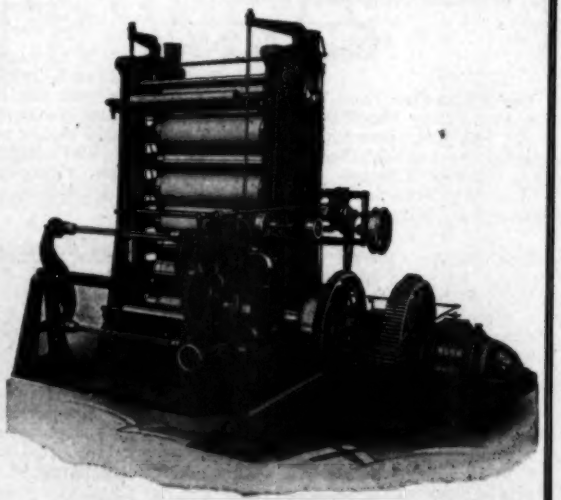
PAPER CUTTERS

Single, Duplex, and Diagonal

CUTTER KNIVES
PATENT TOP SLITTERS

Hamblet Machine Co.
LAWRENCE, MASS.

NORWOOD
SUPER CALENDERS



WE ARE SPECIALISTS IN
Paper Finishing Machinery

NORWOOD ENGINEERING CO.
FLORENCE, MASS., U. S. A.

feet of 5 foot concrete walks and 1,340 lineal feet of 3 foot concrete walks in the Thilmany plant in Kaukauna.

Obituaries

John Strange

John Strange, president of the John Strange Paper Company and the John Strange Pail Company, Menasha, Wis., and former lieutenant governor of Wisconsin, dropped dead Monday afternoon, May 28, while delivering an address before the New London Rotary club. Funeral services were held Thursday.

Mr. Strange was speaking on "The Duties of Citizenship," and was only about half through his address when he stopped suddenly, and without an outcry collapsed. Death was instantaneous and due to heart trouble. He had been ill over a long period, but had been taking excellent care of himself, and his condition had not been considered at all alarming. He had eaten nothing at the dinner, that being his custom at midday, and his address had been in a conversational tone.

Business associates of Mr. Strange were stunned by his sudden death. He was one of the leading citizens of Wisconsin, active not only as a paper manufacturer, but in many civic enterprises. He devoted a great deal of his time to prohibition work. Of late he had taken little part in politics, although at one time he was a leader in Wisconsin. He served as lieutenant governor from 1909 to 1911.

Besides his Menasha interests Mr. Strange was president of the Stevens Point Pulp and Paper Company, of Stevens Point, and a director of the R. McMillan Company, of Oshkosh. Surviving are the widow and four children. Mr. Strange was 71 years old.

John Strange was born at Oakfield, Fond du Lac county, Wisconsin, on June 27, 1852. The same year his parents moved to Menasha. His father worked at manual labor most of his life. As a boy, John worked in the woodenware factory, attending the district school a part of each year. In 1870 he took some special work at Beloit college and later taught school in Rock county, Wisconsin. In 1871 he clerked in a grocery store in Minneapolis and in 1872 became a lumber scaler at Menominee, Mich. The next four years he was engaged in making powder kegs for the Marquette (Michigan) Powder Company, part of the time being also spent buying wheat and doing office work for a flour milling concern.

In 1875 Mr. Strange built the first store at Dale, Outagamie county, selling out the following year. The same year he married and moved to Iowa, where he conducted a retail lumber yard. He returned to Menasha in 1879, and became interested in the manufacture and sale of lumber. He built a sawmill and woodenware factory at Menasha, which three years later was changed into a paper mill for manufacture of wrapping paper.

In 1891 the John Strange Paper Company was organized. He acted as president and general manager until 1896. In 1908 he rebuilt the Strange paper mills, later serving again as its president. He also was a director of the Fox River Paper company, of Appleton. He was a candidate for governor of Wisconsin in the primary of 1911.

Funeral services were held Thursday afternoon, May 31, at Neenah. The body was taken to Oshkosh and interred in the McMillan vault at Riverside cemetery pending completion of the new Strange vault in Neenah.

Mahlon D. Currier

Mahlon D. Currier, general superintendent of the Champion-International Paper Company, of Lawrence, Mass., died at the Lawrence General Hospital on May 29, following an operation for appendicitis. He was born in Hampstead, N. H., 76 years ago, and was an employee of the Champion-International Paper Co., before and since it was under present management for a period extending over 50 years. He was active in Masonry, was first Commodore of the Lawrence Canoe Club, and was head of the League of Essex County Wheelmen. He was accounted an expert on book paper manufacture, and did much to bring to a state of perfection the operations of his company which produced paper for quality publications such as the National Geographic Magazine in addition to making paper for the trade.

Henry L. Beveridge

Henry L. Beveridge, president and founder of the Beveridge Paper Co., died at Catham, Mass., May 7, heart trouble being stated as the cause of death. Mr. Beveridge was born at Troy, N. Y., 1859. He graduated from Amherst College in 1881 following which he ha) been in the paper industry al-

Paper Mill Machinery in Stock Furnished Rebuilt and Guaranteed

"Not Where Is and As Is"

COMPLETE PAPER MACHINE—60" trim. Made by Pusey & Jones. Fourdrinier, two presses, 20 dryers, one stack of calenders, reel, winder, marshall drive.

FOURDRINIER TISSUE MACHINE—One 68".

FOURDRINIER PARTS—Pusey & Jones 112", 100" equipped with new Century shake. 90" Kutter Trowbridge.

PRESS PARTS FOR PAPER MACHINES—Pusey & Jones bell crank housings and Black & Clawson swing arm housings. Press rolls 18"x110" and 20"x80".

DRYERS—Four 48"x111". One 36"x80". Two 30"x84". Nine 30"x62". Two 30"x74". Four 48"x72". Four 42"x68". One 84"x87". Eleven 42"x86". Eight 36"x82". Two 34"x48". Four 20"x39".

CHILLED CALENDERS—One 82" seven roll and one 84" nine roll made by Farrel. One 86" six roll. One 82" five roll. One 60" five roll. One 88" five roll. One 54" five roll.

SLITTERS AND WINDERS—One 84" four drum and one 72" two drum M. & W. winders with slitters. One 120" Warren. One 108" Kidder. One 46" Langston. One 40" Kidder. Two 48" core cutting machines.

BEATERS—Three 72"x42", two 54"x54" N. & W. One Holyoke 84"x80". One Dilts 62"x50" iron tub. One Jones 62"x52". One Dilion 60"x48". Two Emersons 54"x60". Three Downingtown 54"x42" iron tubs. One Jones 42"x38". Six Horns 36"x36". One N. & W. 36"x26". Two No. 2 Claflins.

JORDANS—Two Jones Imperial. Two No. 2 Dillon Improved. Two Monarchs. One large and two small Horns. One Jones Standard. One small Emerson. One Appleton Wazg Majestic. Four Stevens digesters. One Pope brushing.

SCREENS—Three 12 plate. Two 8 plate open side Packer. Two 6 plate. Three white auxiliary and one Moore & White auxiliary. One single cylinder Wandel.

STUFF PUMPS—Deane triplex 9"x8". Goulds triplex 8"x12". Goulds triplex 6"x12". Beloit duplex 6"x14". Two P. & J. duplex 8"x10". Two 6" P. & J. single plunger. Twelve 5" post stuff pumps.

REVOLVING SHEET CUTTERS—62" and 84" Moore & White. Four 60" and one 68" Hamblets. One 48", one 45" and four 60" Finlays. One 82" and 62" and 48" Clark. One 80" Hamblet diagonal.

REAM CUTTERS—Two 48" Acme. Two 42" Cranston under cut.

SUPER CALENDERS—One 52", one 45", one 42", one 36" Holyokes. One 45", one 40" P. & J. One 45" Granger.

WET MACHINES—Four 72" Bagley & Sewall hydraulic. One 58" N. & W.

ENGINES—American Ball variable speed 120 H. P. and one 7"x10", one 10"x10". One 12"x30" Putnam.

Two Daniels Rag Cutters
One 56" Farrel Board Calender
One Manistee Hog Chipper
One Ryther & Pringle Shredder
One screw and two hydraulic Holyoke presses

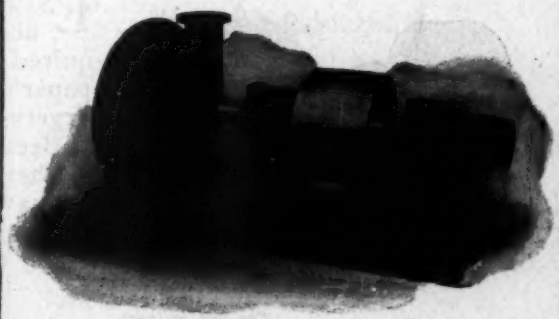
We have a large number of pumps and over five hundred calender, press and couch rolls in stock

FRANK H. DAVIS COMPANY

175 Richdale Ave., Cambridge 40, Mass.

CENTRIFUGAL PUMPS

for



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Reversible flat and roller platform
Lever for raising and lowering top section
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Ability to lower on hoisting spindle as well as quick speed
Cut Gears
Ball bearing wheels
Rugged construction throughout

Electric machines have regular hoist type motor, line switch, reversing controller, upper and lower limits, heavy silent chain drive.

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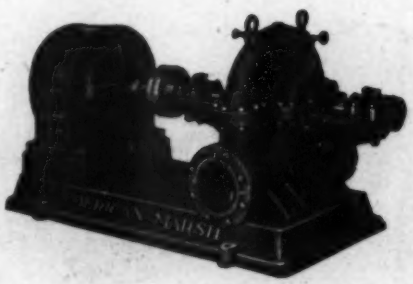
NEW JERSEY FOUNDRY & MACHINE CO., 90 West St., New York City

American-Marsh Paper Mill Pumps

Centrifugal and Direct Acting

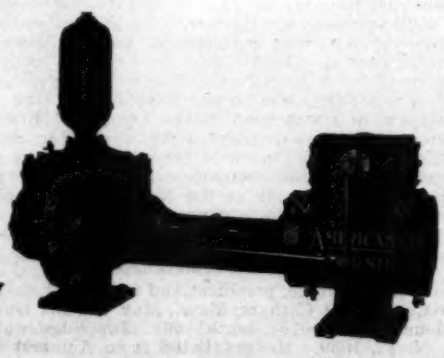


ESPECIALLY adapted for paper mill service where absolute reliability and high efficiency are required. There is an American-Marsh pump for every paper mill requirement, from draining the rolls on the dryers to handling heavy paper pulp stock.

Because of the fact that the factory is located in the heart of the largest paper mill district in the world, we have always made a specialty of paper mill pumps and our designs are the result of careful first hand study of the actual requirements.

The line includes

Boiler Feed Pumps
Centrifugal Pumps
Stock Pumps
Deep Well Engines
Jet Condensers
Air Compressors
Vacuum Pumps
Power Pumps



May we send you our general catalog?

American Steam Pump Company
Battle Creek, Michigan

most constantly. In 1895 he established the Beveridge Paper Co., in Indianapolis.

Mr. Beveridge is survived by the widow and two children, Henry L., Jr., and Ruth.

Theodore M. Gilbert

Theodore M. Gilbert, first vice-president and manager of the Gilbert Paper Co., of Menasha, Wis., died May 7, following an operation. Mr. Gilbert was 62 years old at the time of his death and has been active in the paper industry most of his life.

Charles B. Wing

Colonel Charles B. Wing, one of the founders of the Diem & Wing Paper Co., Cincinnati, died May 12. Death was due to a fall which he had some time ago. Colonel Wing is survived by his widow and two daughters.

Personals

Chester A. Lyman, sales manager and vice president of the International Paper Company, of New York City, has retired from active business, although he will continue as a vice president of the company. Mr. Lyman has been succeeded as sales manager by J. L. Fearing, who has been in charge of the I. P. western sales force, with headquarters in Chicago, for a good many years. At the annual meeting of the Salesmen's Association of the Paper Industry in New York last April, Mr. Fearing was elected president of that organization, in which he has taken great interest since its formation several years ago. Mr. Fearing will in the future make his headquarters at the New York offices of the International in the new Pershing Square Building.

Mr. H. P. G. Norstrand, for the past six years manager of the Greenwich, New York, mill of the Stevens & Thompson Paper Company, has resigned his position, taking effect June 1st. Mr. Norstrand has associated himself with the Saranac Company of Plattsburg, New York, in the capacity of vice-president and general manager. The new company will build a pulp and paper mill in Plattsburg, work on which will be started at once.

The Link-Belt Company, of Chicago and Philadelphia, announce that Mr. L. M. Dalton has succeeded E. J. Burnell as manager of the Boston branch office. Mr. Dalton's appointment comes as a reward for merit shown, he having shown himself in the past an able and competent engineer. Mr. Burnell resigned his post to enter business for himself and he carries with him the best wishes of not only the Link-Belt Company, but those of his many busines associates and friends.

Howard S. Taylor, formerly vice-president and chief engineer of the Management Engineering and Development Co., of Dayton, Ohio, has formed an independent organization of paper and pulp mill engineers, with offices both in this country and Canada. Mr. Taylor is at present president of T. A. P. P. I.

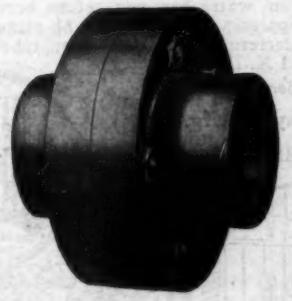
C. M. Nelson, for the past six years associated with the Neenah Paper Co., Neenah, Wis., has been appointed general superintendent of the Carew Mfg. Co., at South Hadley Falls. He will succeed Leon M. Yoerg, who on June 15 assumes his duties as manager of production of the fine paper mills of the American Writing Paper Co.

George A. Galliver, formerly president of the American Writing Paper Company, of Holyoke, Mass., has become affiliated with the Harrison Williams Company, of 60 Wall Street, New York City, which concern specializes in financing industrial enterprises.

John E. O'Brien, well known in the New York paper mill supply trade through his connection with several rag and waste paper concerns, is now with George W. Millar & Company, Inc., of 284 Lafayette Street, New York, associated with the paper stock department of that paper jobbing house.

Henry Burt who for the past several months has been representing the manufacturers of numerous paper mill supplies, has recently joined the Monroe Paper Company, Monroe, Mich., as general superintendent.

Joseph F. Keene, of Katzenstein & Keene, Inc., importers of papermakers' supplies, of 200 Fifth Avenue, New York, sailed for Europe on May 19 for a several months' business trip.



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Designed to withstand severe lineshaft service. Flanged so that the workmen's clothes will not become caught on the bolt heads or nuts. Machined all over to template, making them interchangeable, and therefore easily duplicated.

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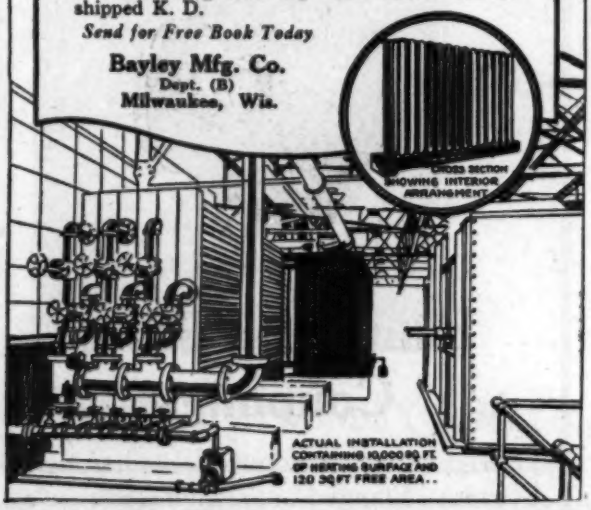
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WARREN IMPROVED CALENDER DOCTORS

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DEALERS IN ALL GRADES OF PAPER

Specialists in

Glassine and Embossed Glassine Papers, Sulphite Bond and Craft

Exclusive Distributors for

Westfield River Paper Company, Russell, Mass.

The Charles W. Knode Company, paper mill representatives, has moved from 52 Broadway to larger and more centrally located offices at 41 Park Row, New York City.

It has been officially announced that H. Biermans has been appointed as president of the re-organized Belgo Paper Co., Shawinigan Falls, Canada.

Gilbert & Nash Co., Incorporated

For the past 25 years, a partnership operating under the name of Gilbert & Nash Company and located at Menasha, Wisconsin, has been putting out wire and felt guides of an excellent nature. This month the business has been converted to a corporate form and is now a properly organized Wisconsin corporation.

Mr. Wm. C. Nash, the inventor of the guide and president of the organization, was the founder of the Lakeside Paper Company of Neenah, Wisconsin (now known as Lakeview Paper Company) and acted as general manager up to the time of its being sold to the Sears Roebuck interests. In the course of his experience and observation he formulated the plans for the wire guide which carries his name. He is also the inventor of a special dandy stand and a sectional suction box cover. Through the Huband & Nash Company, Menasha, he distributes his Acme Shakeless Deckle Frame Support and Pneumatic Shake.

Mr. W. M. Gilbert, vice president, and the late T. M. Gilbert, treasurer, are both well known paper men throughout the country. Owners of the Gilbert Paper Company located at Menasha, Wisconsin, and bearing their name as founders, they have become known as skilled paper mill men. Mr. W. M. Gilbert is now president of the Gilbert Paper Company.

Geo. D. Barnes, secretary and general manager of the company has been connected with it for the past ten years and is well versed in the details. The mill trade should feel confident of service and satisfaction at his hands.

Preparations are rapidly being made to increase the output of the plant and to render added service.

Further Changes in the A. W. P. Co.

The American Writing Paper Co. directors in session in New York, formally elected the following officers of the company: president, S. L. Wilson; vice-president, M. E. Marcuse; treasurer, L. S. Nold; secretary, James T. Robinson. Formerly there were three vice-presidents but two of the offices have been abolished. R. R. Campbell, one of the vice-presidents recently resigned and the other former vice-president, John T. Wolohan, will continue his duties as assistant to the president.

Paul R. Browne, comptroller of the company, has resigned. He has been with the company for several years. Henry L. Cassidy, who has been employed as statistician, has also resigned.

A New Fellowship

The Hammermill Paper Co., through their Chemical Director, Dr. Bjarne Johnson have offered to the trustees of the New York State College of Forestry a fellowship for the coming year (September 1923-1924) to be known as the "Hammermill Fellowship in Pulp and Paper Manufacturing."

The fellowship requires that the recipient be a graduate student at the college (his work leading to the degree of M. S.) His major problem which is to be chosen jointly by the Hammermill Co., and the Department of Forest Chemistry, is to be a fundamental one—and he is to receive $1200 during the year of his candidacy.

Mr. Burton L. Lassing, 105 Grove Pl., Utica, N. Y., member of the graduating class has been designated by the company and the college as the recipient of this signal honor.

In order to secure from the various companies who will exhibit at the Ninth National Exposition of Chemical Industries which will be held at the Grand Central Palace, New York, during the week of Sept. 17 to 22, inclusive, the industries which they are most desirous of reaching through their exhibits, a questionnaire has been sent out by the Exposition management. Based on the expressions of opinion by the majority of exhibitors, the final plans for the 1923 Exposition will be laid. According to types of visitors most desired, appeals will be sent out to these industries and particular emphasis will be laid on features of the program designed to attract them to the Exposition. By deliberately planning the appeal to interest along well defined channels, the management of the Exposition expects to bring materially larger proportions of the buying power of the chemical and equipment consuming industries than in previous years.

A new concern recently organized in New York is the Lay-Lugo Paper Company, which will conduct a general export business in paper with offices at 29 Broadway, New York. Members of the firm are L. Oscar Lay and F. M. Lugo, both of whom are experienced paper men and well known in the trade. Mr. Lay formerly was with the James P. Hefferman Paper Company and has traveled through Latin-American countries for that concern. Mr. Lugo recently resigned his position in the export department of the American Writing Paper Company in New York.

The Cleveland office of the Link-Belt Company has changed from Room 429 to Number 329, and the building in which they have so long found quarters, has again changed hands and names. In the future the address of the Link-Belt Cleveland office will be No. 329 Rockefeller Building.

The Northern Michigan Pulp Co., has filed voluntary petition in bankruptcy in federal court in Grand Rapids. Edwin Crutchfield, local plant manager has been named temporary receiver until such time as a hearing can be held and the case thoroughly gone into.

E. I. du Pont de Nemours & Company announces the development of a new dye known as Pontamine Fast Blue 4 GL, which is a direct color of a greenish shade and great purity of tone. On paper it is faster to light than most of the direct blues.

The Webster Mfg. Company, of Chicago, announces the appointment of Robert T. Pierce as manager of their New York Sales Office at 90 West Street. He succeeds the late Glen N. Porter, whose death occurred March 31st, 1923.

The Chemical Paper Manufacturing Company, manufacturer of fine papers, of Holyoke, Mass., has increased its capital from $2,000,000 to $2,500,000 by the issue of 5,000 additional first preferred shares of $100 par value.

The J. H. Scott Paper Company, mill representatives, has moved from 33 West Forty-second Street to 25 West Forty-third Street, New York City.

The Harland Engineering Co., of Canada, Limited, has removed their office to 291 Mountain St., Montreal, P. Q.

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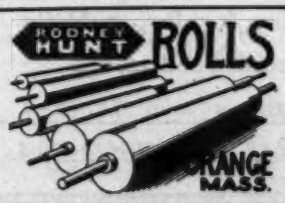
PAPER INDUSTRY BOX 52

Assistant Sales Manager

Eastern mill manufacturing coated cardboards requires the services of an assistant sales manager. Must be college man not more than 25 years of age. Apply giving references and experience. Correspondence will be kept strictly confidential.

Box 53, Care The Paper Industry.



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PLANS AND SPECIFICATIONS
EVALUATIONS AND REPORTS
··CONSULTATIONS··

New York, June 1, 1923.

NOTWITHSTANDING that the customary dull summer period is drawing near, activity in the paper industry continues on a fairly broad scale. Mills in various parts of the country are operating at a brisk rate, perhaps the industry as a whole is still a little below capacity production, but a percentage of the plants are running full tilt and others are only slightly under maximum operation. It is true that demand for some kinds of paper has receded recently. This was to be expected, since it is proverbial for paper consumers to let up in their buying to some extent at this time of the year, and since a great number of paper users covered their requirements so well for a time by placing orders a short while ago that they can now refrain from additional purchasing except to supply unforeseen wants.

That the industry is in a very healthy condition is the opinion expressed on every hand. In spite of the slowing down of demand from many consuming quarters for some kinds of paper, manufacturing activity has subsided but slightly, if at all. Mills have had orders which have kept them going at good speed, and reports generally say that a majority still have commitments on file which will necessitate a maintenance of the current rate of production for some time to come. Present indications are that this is to be a lively summer for paper manufacturers. It may be that demand may recede even further during the next few weeks, but the fact remains that the average consumer of paper has so well anticipated his requirements and has so freely placed orders with manufacturers that the probabilities are most paper mills will keep going at an exceptionally large rate of output during the entire summer.

If anything, the paper industry has experienced less of a let-down in activity during the past two months than any of the other basic industries of the country. There is no gainsaying that industrial activity has subsided to a marked extent recently. The steel, textile, building, clothing and other major industries are in a quieter position than they were a short while ago. This seems to be more the result of circumstance than of any pronounced recession of demand for manufactured products, and the mere fact that production has slowed down is viewed as the healthiest condition that could possibly have developed. Manufacturing in the United States was proceeding at too rapid a clip in the early months of the year. Manufacturers were going ahead producing at a rate not compatible with the existing demand, when the lack of export trade was taken into consideration, and it was plain to be seen that industry was heading for another period of inflation of production and prices. Fortunately the brakes were put on, and the manufacturers of the nation are now sizing up matters in a more comprehensive way and are regulating their output so as to prevent a recurrence of the never-to-be-forgotten business depression experienced a year or so ago.

Since production has been turned down to a healthier scale, it is the opinion of most bankers, economists and business men that good and steady activity will be enjoyed over the next few months. Many expect to see a near boom in business in tne fall. Indications are that production in all branches of industry is now being so carefully gauged that when the usual expansion of demand for various products develops in the fall it will be necessary for manufacturers to promptly speed up their plants, thus leading to a general increase in industrial activity. That the paper industry will share in its full measure in this anticipated broadening of business goes without saying, because after all the paper industry is dependent on practically all other industries for any situation that may exist within its own environs.

That paper manufacturers are aiming to do anything they can to maintain the demand for their product is indicated in the announcement by the International Paper Company that no change will be made in the price of news print over the latter half of this year to contract customers, it being the intention of the company to keep the price of standard news at $75 a ton f.o.b. mills for both the third and fourth quarters of 1923. This announcement came as somewhat of a surprise in numerous quarters of the trade. Expectations had been rife that news print prices would be advanced at least $5 a ton commencing July 1, and there were many intimations that such would be the case. Certainly, there is every warranty for manufacturers increasing their prices, since labor is higher —an advance in wages having recently been granted news print mill workers—raw materials of nearly every description are costlier, and demand is of a breadth where full justification could be seen in an advance in print paper quotations. However, since the leading producing company will not increase prices it is doubtful that other manufacturers will effect any change, and members of the trade see in this nothing else than a move to encourage buying and to prompt publishers to continue using news print in the same big volume as thus far this year.

News print is moving into consuming channels in large tonnage. Newspaper publishers in New York and in other large cities are printing as big or larger issues as at any time earlier in the year, and in frequent cases they are obliged to omit advertising because of the lack of space. Mills the country over and in Canada are being rushed to fill the demand for print paper, and prospects are they will keep at full capacity operation throughout the summer period.

The latest Federal Trade Commission report shows that production of print paper reached a total of 116,719 net tons in April in the United States, of which 107,023 net tons were standard news, compared with 129,294 net tons of total news print produced in March, of which 117,075 net tons were standard news. Production of total news print in the first four months of 1923 amounted to 488,076 net tons, which was far above that of any similar period in the past with the single exception of the first four months of 1920, when production reached a total of 500,014 net tons. April print paper output was five per cent greater than the average monthly production over the past five years, and was four per cent in excess of the output of April, 1922.

Fine papers are enjoying a steady demand. Current buying is not as voluminous as it was a short while back, but this is little noticed by manufacturers, since they are well supplied with orders and are running their plants at a rapid rate trying to catch up with commitments. Prices of bonds and ledgers are firm and such changes as are developing are almost without exception in an upward direction.

Book paper mills are busily engaged and also have enough orders on file to keep them producing at their present rate for some time. Quotations are fully maintained and in some quarters advanced have been announced, one of the leading producers lately marking up prices $5 a ton on all lines of book paper.

Coarse papers are seasonably quiet. A good demand prevails in the West for wrappings, but consumers generally are depending on deliveries on back orders to supply their wants at present and are not engaging in much new buying. Quotations are steady, however, on both wrapping and tissue papers.

Box boards are in moderately good demand. For a while recently the market slumped, but since then buying has increased and quotations have hardened. About $62.50 a ton f.o.b. New York is the price quoted by eastern manufacturers for plain chip board, and $65 for news board.

Brass Fourdrinier Wires

The Armstrong Bureau of Related Industries, for its clients, the manufacturers of paper machine wires, furnishes for publication the following prevailing market price information on brass Fourdrinier wires (new standard) as last quoted to the trade by the respective sellers and cleared through the Bureau:

	Price per sq. ft.
No. 60 mesh	52c-53c
No. 65 mesh	55c-56c
No. 70 mesh	59c-60c
No. 75 mesh	62c-65c
No. 80 mesh	64c-75c

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The location of the Diamond plants at Painesville, Ohio, where they are directly served by three trunk line railroads, assures a constant supply of these materials.

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Domestic Raw Materials

Papermaking Rags

Papermaking rags are in a rather irregular market position. It is usual for prices of rag stock to ease during the spring and early summer, and that is what has happened and is still happening in some grades, yet other qualities of rags are holding remarkably steady in price and unless unforeseen developments occur it seems likely that these grades will not be affected by the customary sagging of the market at this period of the year. Weakness in rag stock is chiefly noticed in the low qualities—those used by roofing paper manufacturers. Roofing stock has been almost steadily on the decline for some weeks, and prices at present are at the lowest point for the current year thus far. New cuttings also have softened in price to a considerable degree. On the other hand, old white rags and thirds and blues are holding very steady, and demand for these descriptions is of such character and volume as to make for a firm market position.

Generally speaking, buying of rags by papermakers has been of narrow dimensions during the past month. This is invariably the case at this time of the year, when consumers are aware that spring collections should make for larger available supplies of rags and when most paper mills are desirous of keeping stocks of raw materials down for inventory-taking. This has been one of the two outstanding bearish factors in the market; the other has been the heavy imports of papermaking rags from Europe, particularly low grades for felt mills. Probably a new high record of rag imports into the United States was established in May, at any rate the amounts of rag stock received at New York and other Atlantic ports last month were exceptionally large and came close to exceeding the imports of any month in the past. The bulk of these imports was low-grade rags and it is but logical therefore that roofing stock has shown greater price easiness than other classes of rags.

The lull in demand at just this time was expected by dealers and importers, and sentiment in the trade has been little affected thereby. Most sellers of rags are bullishly inclined, and it can be said that there is by far less pressure being exerted on buyers than is usually the case at this period of the year. Dealers and packers and importers place much stress on the strong technical position of the market in spite of the comparatively slow demand in recent weeks and the downtrend of prices on many grades. Certainly there are several very bullish factors in the situation. The heavy imports in the past several months have been well absorbed and it is more than likely that mills have consumed these supplies about as rapidly as they have been delivered; prices in Europe are being sustained on high levels—levels which in a good many instances are beyond those importers can afford to meet with the market here in its prevailing condition—which will doubtless serve to diminish buying by Americans abroad for a time, and domestic collections this spring have been short of normal on account of the high cost of labor and the desertion of the rag business by a great many collectors for more lucrative employment.

It is no secret that rag consumption has been heavy since the first of this year. Roofing mills have been chewing up stock at a fast pace; writing, blotting and other paper manufacturers have been using rags in larger amounts than possibly in several years. The heavy imports have been the salvation of the market and doubtless have kept prices from running away, but in spite f this indications are that present available supplies are at least less than normal, and should demand increase, such as many expect it will in the late summer and early fall, prices will probably advance to at least the levels prevailing several months ago and perhaps to even higher marks.

Dealers have endeavored to maintain quotations on new cuttings and yet the lack of important demand has served to weaken prices on most grades. There are a few kinds of new rags which are in light supply, owing to low production, and these rule firm in price; otherwise, market levels have gradually sagged until prices today are a cent per pound and more below the top points of earlier in the year. White shirt cuttings of No. 1 quality are quoted at 12.50 to 13 cents a pound at dealers' shipping points, washables at 4.75 cents, unbleached muslins at 11.75 cents, No. 2 white shirt cuttings at 6 cents and khaki cuttings at five cents. Blue overall cuttings, canton flannels and linen cuttings, on the other hand, are holding steady and show little price change.

Signs point to most packers being well sold up on old white rags and thirds and blues. Moreover, it is claimed that the high cost of labor makes it unprofitable for graders to sort many of these rags and that therefore they are being thrown into roofing stock, thereby limiting the supply. No. 1 repacked whites are quoted at 7 to 9 cents a pound, depending on the quality of the packing, and No. 2 repacked at 4.25 to 4.75 cents. Repacked thirds and blues are quoted at 2.75 to 3.25 cents, and rough packing at 2.25 to 2.50 cents.

Roofing stock is selling at about 1.25 cents a pound for No. 1 packing and 1.15 cents for No. 2 stock in the East, and at from $3 to $5 a ton higher in the West. Foreign dark cottons are down to about 1.40 cents per pound ex dock New York, although some importers are refusing to book orders at less than 1.50 cents.

Average quotations f.o.b. shipping points and ex dock are:

New Stock—	New York and Chicago
White shirt cuttings, No. 1	12.50-13.00
White shirt cuttings, No. 2	6.00- 6.25
Fancy shirt cuttings	5.75- 6.00
Washables, No. 1	4.75- 5.00
Unbleached muslins	11.75-12.00
White lawns	11.00-11.25
Overall cuttings, blue	8.00- 8.25
Black silesias	5.00- 5.25
Light flannelettes	10.00-10.25
Canton flannels, bleached	11.00-11.25
Canton flannels, unbleached	9.75-10.00
Shoe cuttings, bleached	9.75-10.00
Shoe cuttings, unbleached	8.00- 8.25
Light silesias	8.25- 8.50
O. D. khaki cuttings	5.00- 5.25
Mixed khaki cuttings	4.25- 4.50
Corduroy cuttings	3.75- 4.00
Cottonade cuttings	3.75- 4.00
Linens, No. 1 white, foreign	14.00-15.00
Light prints, foreign	5.25- 5,50
Old Stock—	
Whites, No. 1, repacked	7.00- 9.00
Whites, No. 2, repacked	4.25- 4.75
Whites, house soiled	2.50- 2.75
Whites, street soiled	2.25- 2.50
Lace curtains	3.75- 4.00
Thirds and blues, rough	2.25- 2.50
Thirds and blues, repacked	2.75- 3.25
Black stockings	3.25- 3.50
Cotton canvas, No. 1	4.25- 4.50
White cotton batting	4.75- 5.00
Roofing, No. 1	1.25- 1.40
Roofing, No. 2	1.15- 1.30
Dark colored cottons, foreign	1.40- 1.50
Blue linens, foreign	3.50- 4.00
Grey linens, foreign	5.50- 6.00
White linens, foreign	9.50-10.50
Light prints, foreign	2.50- 2.75

Rope and Bagging

After having enjoyed a strong and active market for a lengthy period, old manila rope has developed an easier price tone. The reason for this, however, seems more a matter of market circumstance than any weakening of the technical position of this commodity. The principal consumer of old manila rope has been out of the market as a buyer for a time owing to receipts of large lots of rope from abroad, and the result has been that other paper mills have been offered increased amounts of rope, thus giving them the idea that supplies are larger and causing them to reduce prices. As a matter of fact, old manila rope is in far from plentiful supply. Production for several years back has been under normal and it is not much better today, and proof is not wanting that stocks held by collectors and dealers are merely a "drop

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belting can stand up under paper mill conditions. And even the best belting will not operate efficiently at work for which it is not intended.
When specifying Republic Belting you may be sure that only the Republic Belt specially designed to meet your individual requirements will be supplied. And when you see the name Republic on a Belt you are assured that only the best materials have been used. Result—100% efficiency in power transmission.
Let us serve you.
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New York Chicago Philadelphia Minneapolis
Kansas City Cincinnati Atlanta Pittsburgh
REPUBLIC BELTING

in the bucket" in comparison with what the paper mills of the country ordinarily require. Nevertheless the influx of old rope into the market from foreign sources has put a damper on buying for the present, and prices are close to a cent below the top levels prevailing a month ago.

Domestic manila rope of No. 1 grade is quoted at 6.25 to 6.50 cents per pound at dealers' shipping points, and foreign manila rope at down to 6 cents on the dock. Strings of all kinds, on the other hand, have improved their price position under a livelier demand, indicating that papermakers are mixing in more of this stock. Sisal strings are quoted at 1.75 cents a pound at shipping points, and mixed strings at 1.15 cents and higher.

Old bagging is in the doldrums. Demand is slow and consumers are managing to cover their wants at very near their own prices. Gunny is firm but paper mills are absorbing little of this material. No. 1 scrap bagging is quoted at about 1.25 cents a pound at dealers' points, and roofing bagging at 90 cents to $1 a hundred pounds.

F. o. b. shipping point quotations follow:

	New York and Chicago
Gunny, No. 1 domestic	1.60-1.75
Gunny, No. 1 foreign	1.50-1.60
Scrap bagging, No. 1	1.25-1.35
Roofing bagging	.90-1.00
Wool tares, heavy	1.50-1.65
Wool tares, light	1.40-1.50
Manila rope, No. 1 foreign	6.00-6.25
Manila rope, No. 1 domestic	6.25-6.50
Sisal strings	1.65-1.75
Mixed strings	1.15-1.25

Old Paper

After having held fairly steady for a period of a fortnight or so following the sharp decline in April, prices of waste paper have again turned easy and the trend at present is downward. Recent changes have been narrow because market levels are such that declines must necessarily be small, but the movement is off in nearly every description of stock, and indications are that the only development which could stop the sagging of prices is an appreciable broadening of demand which seems unlikely to occur during the next several weeks or until board mills and other consumers have completed their mid-year inventories. Current demand is strictly against direct requirements, and the orders being placed do not begin to measure up in volume to those of busier times.

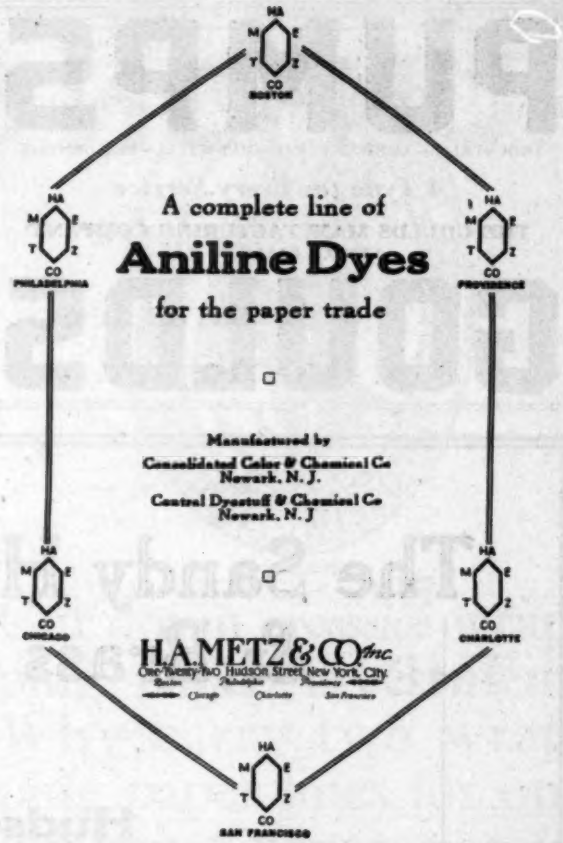
Packers are quoting rather steady prices on the high grades of stock, shavings in particular. No. 1 hard white shavings are quoted at 4.25 cents a pound at shipping points in a majority of cases, and No. 1 soft white at around 3.35 cents. Old kraft paper is relatively steady at 2 to 2.15 cents a pound, and white blank news cuttings are holding their own in price at from 2 cents upwards. Book stock is dull and weak. Eastern mills are buying heavy No. 1 books at 1.90 cents a pound, and probably at less, while crumpled book stock is available at 1.70 cents and ledger stock at 2.25 cents. Folded newspapers have sold in the East down to one cent a pound at shipping points, and No. 1 mixed paper at 80 cents a hundred pounds, though slightly higher prices than these prevail in the West.

F. o. b. shipping point quotations are:

	New York and Chicago
Hard white shavings, No. 1	4.15-4.40
Hard white shavings, No. 2	3.50-3.75
Soft white shavings	3.30-3.50
Colored shavings	1.75-2.00
Heavy book, No. 1	1.90-2.10
Crumpled book, No. 1	1.65-1.75
Ledger stock	2.25-2.40
Kraft, No. 1	2.00-2.15
Manilas, No. 1	1.30-1.40
White blank news	2.00-2.10
Over-issue news, No. 1	1.20-1.30
Folded news	1.00-1.10
Mill wrappers	1.10-1.20
Boxboard cuttings	.90-1.00
Mixed paper, No. 1	.80- .90
Common paper	.60- .70

Chemical Pulp

Reports generally tell of quietness existing in the domestic pulp trade. Paper manufacturers are said to be buying in a very limited way, evidently depending on supplies they have on contract to cover their major needs at present, and being little disposed to anticipate requirements. Judging from statistics, however, a good movement of pulp toward consumers is in progress. Perhaps the great bulk of business is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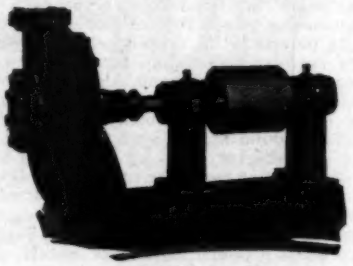

Fig. 192
Taber "V" Type Open Impeller Pump

TABER PUMP CO.
Buffalo N. Y.
Builders of Centrifugal and Rotary Pumps

The Sandy Hill Iron & Brass Works

Hudson Falls
New York

Manufacturers of Paper and Pulp Mill Machinery

$1000.00

CASH FORFEIT

$1000.00 Cash forfeit that the Stickle system for removing air and Condensation from the dryers and automatic regulation of steam for drying will dry more paper evenly with less steam consumed than any equipment manufactured for the same purpose under a competitive test.

STICKLE STEAM SPECIALTIES CO. **Indianapolis, Ind.**

on back orders or contracts, but indications are that most pulp manufacturers are keeping fairly busy and that they are readily finding an outlet for the pulp they are producing.

Statistics show that the domestic industry is enjoying much activity. For example the Federal Trade Commission report places production of chemical pulp in the United States in April at 175,291 net tons, which compares very favorably with the 189,602 tons produced in March and 184,537 tons in January of this year, and on a par with the output of 175,923 tons in February. Moreover, mill stocks of chemical pulp are keeping rather low, amounting to but 55,264 net tons at the end of April, contrasted with 51,574 tons at the end of March, and comparing with average stocks carried by mills over the past four years of 47,829 net tons.

Bleached sulphite is quoted at 5 cents for the No. 1 grade f. o. b. pulp mills, and at 5.25 cents for the selected quality. Unbleached sulphite is quoted at close to 3.50 cents a pound by most producers, and easy bleaching at from 3.50 to 3.65 cents. Kraft is steady at around 3.40 cents for No. 1 grade, and soda pulp is selling at 4.25 cents a pound.

F. o. b. pulp mill quotations follow:

Bleached sulphite	4.75-5.25
Easy bleaching sulphite	3.50-3.75
Unbleached sulphite, No. 1	3.25-3.50
News grade sulphite	3.10-3.30
Soda pulp, bleached	4.00-4.25
Mitscherlich, unbleached	3.50-3.75
Kraft, No. 1	3.25-3.50
Screenings, refined	1.50-1.75

Mechanical Pulp

What appears to be seasonal easiness marks ground wood. Quotations have undergone little important change lately but the tone is soft and the tendency of prices is unmistakably downward. The chief reason for this seems to be that improved water conditions in most grinding districts have enabled producers to increase their output, thus placing a larger available supply of pulp on the market. Furthermore most of the large consumers are grinding all the pulp that they require at present and consequently are out of the market as buyers; in some cases they have a surplus to offer to outside buyers. Thus current supplies are ample and the demand is slow, and the natural sequence is easiness in prices.

Around $37 a ton f.o.b. grinding plants is the basis commonly quoted by domestic manufacturers for prime spruce wood for prompt shipment, and buyers are doubtless getting some supply at under this level, especially when located far away from grinding points and when a heavy freight is involved. Canadian producers are reported quoting from $32 a ton upwards though prices from across the border generally figure out at about the same level delivered consuming mill as domestic pulp.

Reflecting the present easiness of the market, the latest Federal Trade Commission report shows that mill stocks of ground wood are increasing. At the close of April stocks amounted to 89,180 net tons, which was some 30,000 tons in excess of the mill holdings at the end of March. This rise in mill stocks was due largely to increased production, domestic manufacturers producing 154,768 net tons in April as against 124,175 net tons in the preceding month.

Chemicals

Available supplies of casein are much larger than in some months, due to increased imports from the Argentine and other sources recently. Prices of the product are holding fairly steady, however, with about 19 cents a pound the basis generally quoted at shipping points for the domestic article and ex dock New York for imported casein. Bleaching powder is in fair demand and is quoted at about 1.90 cents a pound in domestic drums at works. Caustic soda is steady at 2.50 cents per pound, and soda ash is unchanged at a quotable basis of 1.20 to 1.30 cents a pound. Demand for most papermaking chemicals is fair, with good contract movement observed.

Average quotations are as follows:

Alum, lump ammonia	3.25- 3.50
Alum, lump starch	3.75- 4.00
Blanc fixe, powdered	4.00- 4.25
Bleaching powder	1.85- 2.00
Brimstone (long ton, at mine)	18.00-20.00
Casein (duty paid)	19.00-20.00
Caustic soda, spot delivery	2.50- 2.75
China clay, domestic washed	12.00-15.00
China clay, foreign	15.00-22.00
Rosin, grade E	6.15- ....
Satin white	1.50- 1.75
Soda ash, 58 per cent light (bags)	1.20- 1.30
Starch, papermakers', in bags	2.80- ....
Talc (ton)	14.00-16.00

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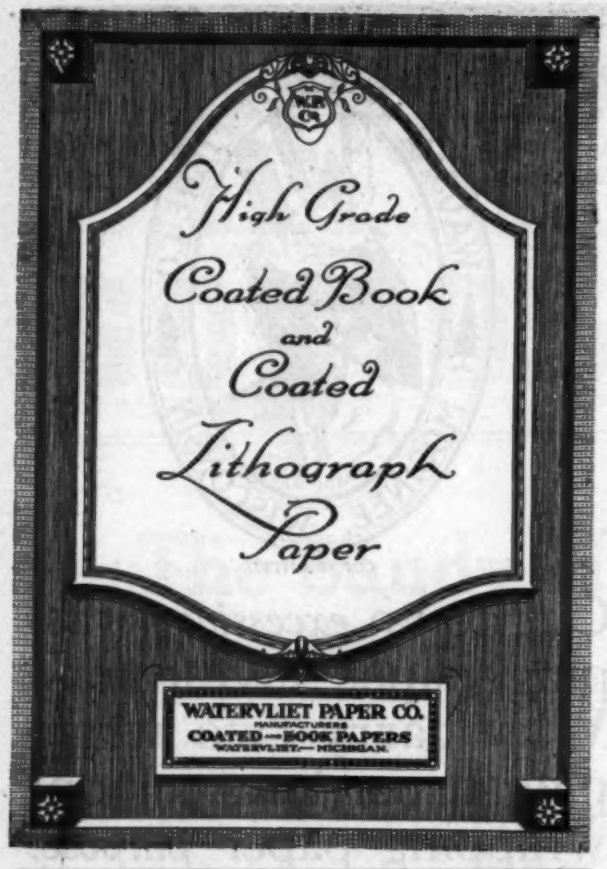

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SKANEATELES FALLS
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FELTS and JACKETS
Top and Bottom Wet Felts for board machines, with all the qualities requisite to insure long life and continuous production.
They Satisfy

New Papers

Writing—	
White rag	20-45
White sulphite	12-30
Colored rag	16-40
Ledger—	
White rag	20-50
White sulphite	14-30
Colored sulphite	15-30
Colored rag	16-50
Bonds—	
White rag	19-45
White sulphite	10-30
Colored sulphite	11-30
Colored rag	18-45
Book—	
No. 1 S. & S. C.	7.00- 7.75
Machine finished	6.75- 7.50
English finished	7.00- 7.75
Coated and enameled	9.00-14.00
Lithograph, M. F.	9.25-14.00
Newsprint—	
Rolls, contract	3.75- 4.00
Rolls, transient	4.00- 4.25
Sheets	4.25- 4.50
Side runs	3.25- 3.50
Cover Stock—	
Coated, both sides	10.25
Coated, one side	10.15
Tissue—	
No. 1 white, 20x30	.90- 1.00
No. 2 white, 24-36	.80- .90
No. 1 manila, 24-36	.80- .90
Kraft	1.00- 1.25
Wrappings—	
No. 1 Kraft	7.00- 7.50
No. 2 Kraft	6.25- 6.75
Boards—	New York and Chicago
Solid news	65.00-70.00
Straw	60.00-65.00
Plain chip	62.50-65.00
White coated chip	80.00-85.00
Manila coated chip	75.00-80.00
Binders' board	85.00-90.00

Foreign Trade Opportunities

Additional information regarding the following foreign trade opportunities issued by the Bureau of Foreign and Domestic Commerce of the United States Department of Commerce may be obtained from the Bureau in Washington, D. C., or its branch offices. It is requested that the number of the inquiry be given at all times.

No. 6259—Rosin, caustic soda and paper. Rio de Janeiro, Brazil. Agency desired.

No. 6296—Paper and paper specialties, including writing, ledger and offset papers, S. C. litho, coated litho, book papers, glassines, butter parchments, box boards, bristols, etc. Winnipeg, Canada. Purchase desired.

No. 6333—Paper and stationery supplies. Rio de Janeiro, Brazil. Agency desired.

No. 6368—Paper and paper goods. Buenos Aires, Argentina. Agency desired.

No. 6376—News print paper and stationery. Budapest, Hungary. Purchase and agency desired.

No. 6386—Modern machinery for the making of cardboard cigarette boxes. Trinidad, British West Indies. Purchase desired.

No. 6435—Cheap stationery. Madras, India. Purchase desired.

No. 6539—Paper honey jars and felt-lined egg boxes. East London, South Africa. Purchase desired.

No. 6546—Safety paper for bank checks and documents. Turin, Italy. Agency desired.

No. 6576—Printing, writing, wrapping and specialty papers, boards and plain stationery. Cape Town, South Africa. Manufacturers' agency desired.

No. 6577—Paper drinking cups. Para, Brazil. Agency desired.

No. 6578—Paper and paper products. Pernambuco, Brazil. Purchase and agency desired.

No. 6579—News print sheet paper, 65 by 112 centimeters, from 40 to 55 grams per square meter, also news print paper sheets 66 by 96 centimeters, 50 to 52 grams per square meter, satin-finish paper, tissue paper and cover paper. Pernambuco, Brazil. Purchase desired.

No. 6580—News print sheet paper, from 36 to 55 grams per square meter, book paper of all kinds, box board for binding and cover paper. Pernambuco, Brazil. Purchase desired.

Recent Publications

Perhaps one of the most interesting pieces of advertising directed to the paper industry for some time is a book issued by The Biggs Boiler Works Co., Akron, Ohio. On the cover of this book is shown reproductions of more than a score of water-marks used by the ancient paper makers of Europe. And what the cover has of interest is but indicative of the interest with which every one of the book's 40 pages is crowded. It is withal an exceptionally interesting and helpful book.

Bulletin No. 4 has just been issued by the Glamorgan Pipe & Foundry Co., Lynchburg, Va. Commenting upon their latest bulletin the advertiser says: "In presenting this discussion on the possibilities of lime recovery to those industries which are more or less dependent upon causticization, particularly the manufacturers of soda and sulphate pulp, we have been actuated by the desire to describe a process by means of which those concerned can both improve the efficiency of their plants and convert a waste into an asset."

The Combustion Engineering Corp., New York, has just issued a mighty attractive book on Quinn Fuel Oil Burning Equipment. The subtitle of this booklet is "A Complete Treatise on the Subject of Oil Burning." To say more about this publication would only be to amplify the above subtitle and the book itself does that very thoroughly.

The National Research Council has recently issued a Colloid Bibliography in mimeograph form. The author, Dr. Harry N. Holmes of Oberlin College, Chairman of the National Research Council Committee on the Chemistry of Colloids, intends this edition to be preliminary to a more comprehensive one. All the references are classified and many are accompanied by brief comment as an aid in deciding on their relative importance.

The Chandler & Taylor Co., of Indianapolis has recently issued an eight-page bulletin announcing the new Chandler & Taylor Prosser High-Economy Engine. This bulletin is a thorough analysis of the principle governing this new Prosser engine.

A small leaflet recently mailed to the trade describes a new method developed by the Keystone Lubricating Co., Philadelphia, of applying grease under high pressure with pipe line distributions to more than one bearing; telling how this result may be accomplished without risk to the operator or waste of grease. A nicely gotten up piece of advertising.

Leaflet No. 2064 issued during April by Allis-Chalmers Mfg. Co., Milwaukee, describes their Type "S" Centrifugal Pumps.

"Away From Methuselah," is the title of a booklet recently published by the Crescent Belt Fastener Co., 381 Fourth Ave., New York. It takes the reader back to the first belt joint made by the cave man in prehistoric times and sketches in semi-humourous style, the development of belt joining from that era up to the present. It is, withal very interesting reading.

The Thilmany Pulp and Paper Co., Kaukauna, Wis., has been receiving bids on installing approximately 3,100 lineal feet of 5 foot concrete walks and 1,340 lineal feet of 3 foot concrete walks.

The B Q QUALITY PULPS

BQ INC.

HAFSLUND NORWAY

"HAFSLUND BEAR"
Bleached Sulphite

F: HAGA

"FORSHAGA"
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"HURUM SPECIAL"
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EASTERN AGENTS of Sulphite Pulp. Made by
Port Huron Sulphite & Paper Co., Port Huron, Mich.

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INCORPORATED
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FOREIGN AND DOMESTIC
PAPER MAKERS' SUPPLIES
CHEMICAL AND MECHANICAL PULPS
COTTON, JUTE AND FLAX WASTES
EAST INDIA MERCHANDISE

Agents
SUNDS AKTIEBOLAG
STRONG SULPHITE
indirect cooking

PERKINS-GOODWIN CO.
NEW YORK
PULP and PAPER

Agents
A/S Toten Cellulosefabrik
BLEACHED AND
EASY BLEACHING
SULPHITE

Wood Pulp

Current demand for foreign wood pulp is slow. Importers in New York are frank to say that paper manufacturers are on a "buying strike" with respect to absorbing fresh supplies of pulp in any important volume, yet in spite of the lack of demand prices hold very firm and there is much less selling pressure than is usually in view with the market characterized by the circumstances that now exist. Importers regard the situation in a bullish light. They place emphasis on the low level of stocks in Scandinavia and the sold up state of mills in Sweden, and contend that the probabilities are American consumers will be unable to secure normal amounts of pulp from Scandinavian sources for the remainder of this year as a result of the great loss of production suffered by Swedish manufacturers during the strike and lockout of mill workers last winter. Moreover, it is said that producers on the other side of the Atlantic are quoting firm prices and that, being in a more or less independent position because of having the greater part of their output for the rest of this year sold, they are refusing to consider any offers of reduced prices.

In spite of these seemingly bullish factors, papermakers in the United States are in anything but a mood to purchase pulp at this time. There is of course a routine demand, but no wholesale buying is being engaged in, and trading is very much in abeyance for the present. Consumers in this country seem determined to wait for the arrival of first open water shipments from Sweden, probably having their stocks so arranged that they can afford to hold off from further buying, and probably figuring that the influx of pulp from Sweden into the United States in the next few weeks may cause a weakening of prices. Late reports state that open water shipments over the Baltic have commenced, and it is likely that some large shipments will be received here in the near future.

Government statistics show that pulp imports continue on a large scale. Imports in January reached a total of 117,182 net tons of chemical pulp, which while somewhat below the importations in the two preceding months, were greater than in any other month of 1922, comparing with 154,347 net tons imported in December last, 126,829 tons in November, 109,346 tons in October and 95,737 tons in January a year ago. Imports of ground wood in January last amounted to 32,467 net tons, establishing a new high mark for the past thirteen months, contrasted with 30,447 tons imported in December, 27,475 tons in November, 25,921 tons in October and 20,920 tons in January, 1922.

Prime unbleached sulphite is reported freely bringing 3.40 to 3.50 cents per pound ex dock New York, while half-prime grades are quoted at around 3.25 cents. Kraft pulp is very firmly held, and reports say that spot stocks of this pulp in the United States are down to a minimum. Importers ask 3.35 cents on the dock in most cases, though some name higher prices. Easy bleaching sulphite is quoted at from 3.50 cents upwards ex dock, and bleached sulphite of No. 1 quality at around 4.75 cents. Ground wood is beyond the price level of the domestic product, importers generally asking $42 a ton or more ex dock.

Receipts at the port of New York in May and current market quotations, ex dock New York, follow:

Bleached sulphite, No. 1	$ 4.50- 5.00
Unbleached sulphite, No. 1	3.35- 3.50
Easy bleaching	3.50- 3.75
Mitscherlich unbleached	3.50- 3.75
Kraft	3.35- 3.50
Ground wood, per ton	40.00-43.00

Castle & Overton, 4,028 bls. from Bremen and 1,700 bls. from Hamburg; Seggerman Bros., 1,600 bls. from Gothenburg; M. Gottesman & Co., 1,200 bls. from Bremen and 4,335 bls. from Hamburg; National City Bank, 6,400 bls. from Halmstad and 1,200 bls. from Hamburg; Buck, Kaier & Co., 250 bls. from Gothenburg; Borregaard Co., 360 bls. from Christiania and 180 bls. from Copenhagen; H. Hollesen, 5,129 bls. from Bremen and 491 bls. from Hamburg; E. M. Sergeant & Co., 1,125 bls. from Copenhagen and 125 bls. from Hafslund; International Acceptance Bank, 1,250 bls. from Gothenburg; Woodpulp Trading Co., 1,575 bls. from Hamburg; Guaranty Trust Co., 31 bls. from Antwerp; Tidewater Paper Mills Co., 14,926 bls. ground wood from Liverpool, N. S., and 8,897 bls. ground wood from Murray Bay; E. J. Keller Co., 428 bls. from Bremen; Nilsen, Lyon & Co., 600 bls. from Christiania; Lagerloef Trading Co., 4,390 bls. from Hango; J. Andersen & Co., 546 bls. from Trieste and 2,180 bls. from Hafslund; Johaneson, Wales & Sparre, 655 bls. from Gothenburg; Scandinavian Pulp Agency, 1,000 bls. from Copenhagen; Robert Dollar Co., 1,876 bls. from Vancouver; Mechanics & Metals National Bank, 1,000 bls. from Hafslund; Order, 1,615 bls. from Hango.

Paper Stock

The feature of papermaking materials imports into the United States in May was the large amounts of rag stock received. Probably a new high record of rag imports was established last month, if the statistics compiled from the manifests of steamers discharging at New York can be taken as an indication. Scarcely a day pased throughout the entire month that several vessels did not arrive at New York with big lots of papelmaking rags in their cargoes. Imports of old rope also were heavy, while usual amounts of old bagging and waste paper were received.

Arrivals at the port of New York in May follow:

Old Rope

Brown Bros. & Co., 344 coils and 269 bls. from Antwerp, 640 coils and 94 bls. from Rotterdam, 592 bls. and 766 coils from London, 69 coils from Christiania, 539 coils from Bristol, 40 coils from Hamburg, 114 bls. from Havre, 85 bls. from Liverpool, 151 coils and 72 bls. from Newcastle and 325 coils and 20 bls. from Hull; Ellerman-Wilson Line, 69 coils from Southampton, 48 coils from London and 86 coils from Hull; International Acceptance Bank, 58 coils from Bremen and 48 coils from Glasgow; W. Schall & Co., 70 coils from Newcastle and 70 bls. from Barcelona; International Purchasing Co., 30 coils and 83 bls. from Havre and 62 coils from Rotterdam; Cuban-American Metal Co., 23 bls. from Havana; E. J. Keller Co., 226 coils from Newcastle, 127 bls. from Marseilles and 79 coils from Hull; Irving Bank-Columbia Trust Co., 46 coils from Antwerp; M. Wolfer & Co., 38 bls. from Havana; Bank of New York & Trust Co., 106 bls. from Copenhagen; American Exchange National Bank, 87 coils from Hamburg; Pollack Bros., 38 bls. from Barcelona; Lee, Higginson & Co., 29 bls. from Rotterdam; Equitable Trust Co., 113 coils from Newcastle; Katzenstein & Keene, 44 bls. from Leghorn; Stone Bros. & Victor Galaup Co., 40 bls. from Havre; Order, 167 bls. from Barcelona, 44 bls. from Genoa, 190 coils from Antwerp, 91 coils from Bristol, 25 coils from Rotterdam, 133 coils and 19 bls. from London, and 40 bls. from Havre.

Old Bagging

Maurice O'Meara Co., 499 bls. from Rotterdam; P. Berlowitz, 69 bls. from Havre; Katzenstein & Keene, 160 bls. from London; S. Silberman Co., 1,264 bls. from Rotterdam; New York Trust Co., 641 bls. from Rotterdam; Guaranty Trust Co., 268 bls. from Rotterdam; E. Butterworth & Co., 165 bls. from Rotterdam; E. J. Keller Co., 433 bls. from Antwerp, 129 bls. from Hamburg, 84 bls. from Rotterdam and 145 bls. from Rouen; R. F. Downing & Co., 211 bls. from Antwerp; Castle & Overton, 54 bls. from Antwerp; Waste Material Trading Corp., 245 bls. from Rotterdam; Irving Bank-Columbia Trust Co., 87 bls. from Manchester and 55 bls. from Antwerp; Mechanics & Metals National Bank, 26 bls. from Manchester; C. R. Spence & Co., 202 bls. from Dublin; Equitable Trust Co., 101 bls. from Havre; Order, 140 bls. from Marseilles and 472 bls. from Barcelona.

Rags

Katzenstein & Keene, 308 bls. from Genoa, 152 bls. from London, 1,039 bls. from Rotterdam, 26 bls. from Barcelona, 30 bls. from Antwerp and 142 bls. from Havre; Castle & Overton, 271 bls. from Rotterdam, 67 bls. from Havre, 44 bls. from Leith and 46 bls. from Antwerp; E. Salomon Corp., 128 bls. from Havre; Maurice O'Meara Co., 174 bls. from Buenos Aires, 39 bls. from Hamburg and 63 bls. from Leith; P. Berlo-

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Miscellaneous Paper Stock

Crane & Co., 12 bls. from Dundee; Marquardt-Hewitt Corp., 68 bls. from Dundee; American Exchange National Bank, 175 bls. from Antwerp; E. J. Keller Co., 652 bls. from Antwerp; Naional City Bank, 355 bls. from London and 1,157 bls. from Antwerp; American Express Co., 25 bls. from Glasgow and 31 bls. from Dundee; Andrews & Cook, 32 bls. from Yokohama; Irving Bank-Columbia Trust Co., 1,160 bls. from Antwerp; Equitable Trust Co., 1,354 bls. from Antwerp and 110 bls. from Marseilles; Guaranty Trust Co., 617 bls. from Antwerp; Kidder Peabody Acceptance Corp., 280 bls. from Antwerp; Goldman, Sachs & Co., 413 bls. from Antwerp; W. Schall & Co., 67 bls. from Antwerp; Lloyd Royal Belge, 225 bls. from Antwerp; Bank of America, 44 bls. from Glasgow; International Acceptance Bank, 172 bls. from Glasgow and 216 bls. from Antwerp; G. E. Stechert & Co., 4 bls. from Gothenburg; Salomon Bros. & Co., 128 bls. from Antwerp; E. Salomon Corp., 208 bls. from Havre; Prince & Kennedy, 9 bls. from Dublin; C. R. Spence & Co., 83 bls. from Dublin; Brown Bros. & Co., 124 bls. from Dublin; M. Wolfer & Co., 16 bls. from Havana; Order, 2,546 bls. from Antwerp, 179 bls. from London and 482 bls. from Dundee.

Paper

Imports of paper into the United States in May were fairly heavy, judging from the manifests of steamers arriving at the port of New York during the month. Large amounts of kraft wrapping paper, principally from Germany and the Scandinavian countries, featured the arrivals. More wrapping paper was received than in several months, whereas imports of news print paper fell off. Usual amounts of cigarette, hang-

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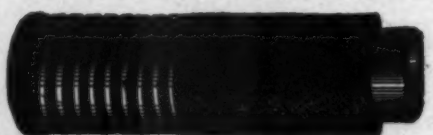

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ing, filter and drawing papers were imported. Receipts of paper of all kinds through the port of New York in May follow:

Cigarette

Rose & Frank Co., 320 cs. from Havre and 11 cs. from Southampton; P. J. Schweitzer, 50 cs. from Antwerp; International Mercantile Marine Co., 15 cs. from Antwerp; Southern Pacific Co., 3 cs. from Havre; Knauth, Nachod & Kuhne, 4 cs. from Trieste; G. A. Henshaw & Co., 21 cs. from Liverpool; J. V. Lago, 4 cs. from Allicante; Loaiza & Co., 50 bls. from Genoa; M. C. Miguel, 30 cs. from Barcelona: H. H. Straus, 2 cs. from Havre; De Manduit Paper Corp., 102 cs. from Havre and 297 cs. from St. Nazaire; American Tobacco Co., 1,200 cs. from Bordeaux; R. J. Reynolds Tobacco Co., 470 cs. from St. Nazaire; Surbrug Co., 21 cs. from Havre; Order, 20 cs. from Barcelona.

Printing

B. F. Drakenfeld & Co., 127 cs. from Liverpool; M. Gottesman & Co., 333 rolls from Gothenburg; Newsprint Paper Corp., 319 rolls from Gothenburg; Chemical National Bank, 1,313 rolls from Hamburg; Fernstrom Paper Co., 234 rolls from Hamburg; T. Nevin, 3 cs. from London; C. Steiner, 59 cs. from Hamburg and 97 cs. from Rotterdam; E. Dietzgen & Co., 105 cs. from Hamburg; H. Reeve Angel & Co., 345 rolls from Hamburg and 1,034 rolls from Antwerp; Lithoprint Co., 2 cs. from Rotterdam; Great Eastern Paper Co., 114 rolls from Copenhagen; F. B. Vandegrift & Co., 61 cs. from Hamburg; Perry, Ryer & Co., 59 cs. from Glasgow; Bulkley, Dunton & Co., 186 rolls from Bremen; Maurice O'Meara Co., 172 rolls from Antwerp; Oxford University Press, 21 cs. from Liverpool; P. C. Zuhlke, 477 cs. from Hamburg; Coyle & Grant Co., 4 cs. from Glasgow; American Exchange National Bank, 56 rolls from Christiania; Newark Ledger, 187 rolls from Gothenburg; Parsons & Whittemore, 1,512 rolls from Stockholm; L. Schulman Co., 45 cs. from Antwerp; Order, 76 rolls from Hango, 52 rolls from Christiania, 4,196 rolls from Bremen, 282 rolls from London and 66 cs. from Hamburg.

Wrapping

Chase National Bank, 86 rolls from Hamburg; D. S. Walton & Co., 256 rolls from Hamburg; National City Bank, 513 rolls and 156 bls. from Hamburg and 423 rolls from Gothenburg; Chemical National Bank, 736 bls. from Hamburg and 698 bls. from Gothenburg; J. P. Heffernan Paper Co., 908 bls. from Gothenburg; C. K. McAlpine & Co., 109 rolls and 70 bls. from Gothenburg; Arkell Safety Bag Co., 1,584 rolls and 36 bls. from Gothenburg; Thomas Barrett & Son, 49 bls. from Gothenburg; Guaranty Trust Co., 271 rolls and 280 bls. from Hamburg; Republic Bag & Paper Co., 8,853 rolls from Hamburg and 6,155 rolls and 217 bls. from Rotterdam; Wilkinson Bros. & Co., 124 bls. from Hamburg, 2,277 rolls and 432 bls. from Rotterdam and 14 bls. from Antwerp; Publicity Paper Corp., 6 bls. from Hamburg; Public National Bank, 4,033 rolls and 3,535 bls. from Hamburg; Jordan, Marsh & Co., 31 bls. from Trieste; Ladenburg, Thalman & Co., 1,535 bls. from Trieste and 800 bls. and 490 rolls from Hamburg; J. B. Moors & Co., 221 bls. from Trieste; International Acceptance Bank, 213 rolls and 380 bls. from Christiania, 25 bls. from Trondhjem, 167 bls. and 18 rolls from Hamburg and 1,030 rolls and 303 bls. from Copenhagen; Bulkley, Dunton & Co., 182 rolls from Antwerp; J. B. Harris & Co., 154 bls. from Antwerp; H. Reeve Angel & Co., 782 rolls and 643 bls. from Antwerp; Globe Shipping Co., 7 cs. from Rotterdam; Irving Bank-Columbia Trust Co., 72 rolls from Antwerp, 762 bls. from Hamburg and 85 rolls and 10 bls. from Gothenburg; Blauvelt-Wiley Paper Mfg. Co., 191 bls. from Glasgow; Maurice O'Meara Co., 803 bls. from Gothenburg; M. M. Cohen, 537 rolls and 167 bls. from Gothenburg; M. D. Knowlton Co., 114 rolls from Gothenburg; De Nobili Cigar Co., 33 bls. from Genoa; L. Schulman & Co., 96 bls. from Piraeus; Vargo Trading Co., 178 bls. from Rotterdam; Birn & Wachenheim, 96 bls. from Rotterdam; National Bank of New York, 42 rolls and 43 bls. from Hamburg; Standard Underground Cable Co., 89 bls. from Glasgow; Bankers Trust Co., 988 rolls and 257 bls. from Hamburg; Peoples Trust Co., 706 rolls from Gothenburg; Equitable Trust Co., 758 rolls and 381 bls. from Gothenburg; W. E. Shuttleworth & Co., 403 rolls and 10 bls. from Gothenburg; U. S. Paper Co., 131 rolls and 39 bls. from Gothenburg; C. C. Keferstein, 87 bls. from Bremen; Fernstrom Paper Co., 38 bls. from Hamburg; C. Steiner, 34 bls. from Hamburg; Order, 699 bls. and 391 rolls from Hamburg, 3,665 rolls; from Bremen 236 rolls from Christiania, 786 bls. from Rotterdam, 607 rolls from Gothenburg, 328 bls. from Antwerp and 83 bls. from Copenhagen.

Writing

Black, Starr & Frost, 3 cs. from Havre; Coenca-Morrison

PRATT & CADY
ASBESTOS PACKED COCKS

Fig. 248

Vulcanized asbestos groove-packed iron cocks for rugged service or caustic lines. Especially adapted for use on digesters.

Pratt & Cady asbestos packed cocks are made to stand pressures up to 250 lbs. and temperatures up to 500° F. Their use will prove economical.

Fig. 247

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FOR STUFF PUMPS

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De Laval Direct Current Generators for Paper Mill Drive

DIRECT CURRENT generators have advantages wherever a wide range of speed adjustment is desirable. For supplying direct current two methods are available, either turbine driven direct current generators may be used or the current may be obtained from an alternating current distribution system by means of transformers, rotary converters or motor generators. The production of direct current by turbine driven generators is the most economical of steam, as well as most simple and lowest in first cost and operating expense.

The photograph shows a De Laval 600 K. W. geared turbine driven direct current generating set supplying current for the operation of a paper machine. Each set of rolls is driven by an individual motor, the speed of which can be adjusted independently of the other motors, so that each set of rolls can be run at the correct speed to take up the "draw" of the paper. The speed of the turbine is held within close limits by an oil relay governor, but the voltage can be adjusted by varying the excitation. There is, of course, no cyclical speed variation, as with a reciprocating engine.

De Laval steam turbines are built with velocity stages for small and medium size units where the exhaust can be used in heating, drying or other processes. Where high efficiency is desired and for large sizes, pressure stage turbines are used. They may be designed for back pressure, bleeder, mixed flow or vacuum service.

By means of the De Laval speed reducing gears, De Laval turbines are adapted for driving all classes of machinery, for rope and belt drive, and for direct connection to shafting.

Our Engineering Department will gladly study your pump and power requirements with a view to suggesting the most economical and suitable equipment and arrangement.

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Local Offices:—Atlanta, Birmingham, Boston, Charlotte, Chicago, Cleveland, Dallas, Denver, Duluth, Indianapolis, Kansas City, Los Angeles, Montreal, New York, New Orleans, Philadelphia, Pittsburgh, Salt Lake City, San Francisco, Seattle, Toronto. 232

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Co., 6 cs. from Havre; Judson Freight Forwarding Co., 15 cs. from Antwerp; J. W. Hampton, Jr., & Co., 10 cs. from Hamburg; U. S. Trust Co., 3 cs. from London; E. Dietzgen & Co., 22 cs. from Marseilles; Defiance Manufacturing Co., 6 cs. from Marseilles; Globe Shipping Co., 4 cs. from Southampton; Order, 52 cs. from Trieste and 26 cs. from Bremen.

Drawing

Keuffel & Esser Co., 177 cs. from Hamburg and 1 cs. from London; H. Reeve Angel & Co., 6 cs. from London; E. Dietzgen & Co., 1 cs. from London; R. F. Downing & Co., 3 cs. from Southampton; Order, 3 cs. from London.

Filter

E. Fougera & Co., 130 cs. from Southampton; H. Reeve Angel & Co., 51 cs. from London & 3cs. from Southampton; J. Manheimer, 39 bls. from Southampton and 42 bls. from Havre; Scientific Materials Co., 3 cs. from Bremen; A. Giese & Son, 20 bls. from Bremen; G. Lueders & Co., 10 bls. from Bordeaux.

Tissue

C. H. Wyman Shipping Co., 6 cs. from Liverpool; Meadows, Wye & Co., 13 cs. from Liverpool; F. C. Strype, 74 cs. from Liverpool; Iwai & Co., 17 cs. from Kobe; Order, 8 cs. from Liverpool.

Photo

Gevaert Co. of America, 113 cs. from Antwerp; Globe Shipping Co., 78 cs. from Bremen; M. G. Lange & Co., 9 cs. from Bremen; J. J. Gavin & Co., 3 cs. from Liverpool.

Hanging

F. J. Emmerich & Co., 7 cs. from Rotterdam; State Forwarding & Shipping Co., 1,173 bls. from Bremen; W. H. S. Lloyd & Co., 174 bls. from London and 13 bls. from Liverpool; A. Murphy & Co., 29 bls. from Liverpool, 8 bls. from Southampton and 13 bls. from Hamburg; A. C. Dodman, Jr., & Co., 119 bls. from Liverpool and 8 bls. from Southampton; R. F. Downing & Co., 3 bls. from Southampton, 20 bls. from London and 25cs. from Yokohama; National City Bank, 985 bls. from Bremen and 242 bls. from Hamburg.

Board

Buschmann Bros., 710 rolls from Rotterdam and 122 rolls from Bremen; Coty, Inc., 79 cs. from Havre; Park & Tilford, 4 cs. from Southampton; Montag & Cassidy, 4 cs. from Liverpool; Birn & Wachenheim, 100 bls. from Hamburg; New York Label & Box Works, 7 cs. from Hamburg; Harriett Hubbard Ayer, 4 cs. from Havre; Phoenix Shipping Co., 3 cs. from Hamburg; American Express Co., 5 cs. from Hamburg; Bendix Paper Co., 59 cs. from Hamburg; Metropolitan Importing & Mfg. Co., 37 cs. from Hamburg; Knauth, Nachod & Kuhne, 45 cs. from Bremen; Alpers & Mott, 22 cs. from Bremen; R. Reiners, Inc., 6 cs. from Bremen; H. Brockelbank, 14 bls. from London; Houbigant, Inc., 21 cs. from Southampton; Order, 20 cs. from Hamburg, 1,152 bls. from Hango and 1,084 bls. from Stockholm.

Miscellaneous

Birn & Wachenheim, 201 bls. from Hamburg, 23 cs. from Antwerp, 17 cs. from Southampton and 24 cs. from Havre; P. H. Petry & Co., 40 cs. from Hamburg; A. Frankan & Co., 14 cs. from Bremen; M. G. Lange & Co., 9 cs. from Bremen; C. A. Johnson & Co., 82 bls. from Liverpool; Whiting-Patterson Co., 38 cs. from Havre; H. Reeve Angel & Co., 8 cs. from Gothenburg; Richardson Bros., 45 cs. from Hamburg; F. L. Kraemer & Co., 17 cs. from London; Ault & Wiborg, 40cs. from Hong Kong; M. J. Corbett & Co., 12 cs. from Hamburg; F. G. Prager & Co., 37 cs. from Bremen; Borden & Riley Paper Mfg. Co., 8 cs. from Antwerp; Globe Shipping Co., 93 cs. from Bremen and 2 cs. from Havre; C. H. Boulin, 104 cs. from Havre; Pacific Bank, 53 cs. from Yokohama; Coenca-Morrison Co., 5 cs. from Havre; G. W. Sheldon & Co., 4 cs. from London; F. S. Freed, 3 cs. from Southampton; Judson Freight Forwarding Co., 38 cs. from Havre; Van Vlaunderen Machine Co., 15 cs. from Dunkirk.

For the purpose of expansion Eaton, Crane & Pike, sole manufacturing agents for Crane & Co., famous bank note paper manufacturers, are issuing 7 per cent cumulative preferred stock.

The Chemical Paper Manufacturing Co., Holyoke, Mass., has increased its capital stock from $2,000,000 to $2,500,000. Expansion of the company is rumored in the near future.

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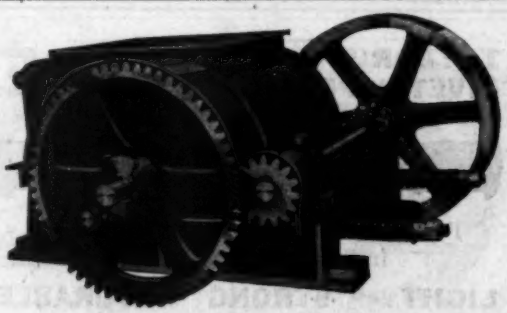

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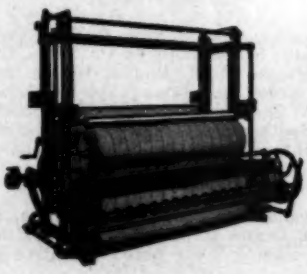

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The B. F. Sturtevant Goes West

Owing to increasing business and the desire to be of still greater service, to its customers, the B. F. Sturtevant Company has long felt the need of a manufacturing plant in the middle west.

As almost every installation calls for specific engineering, it has been found difficult and expensive at times, to give full attention to this westward business from Hyde Park; therefore, the Sturtevant Company has purchased the plant of the Wisconsin Engine Co., makers of Corliss Pumping Engines at Corliss, Wisconsin—westward according to Greely.

This new acquisition covers nearly ten acres and the buildings have approximately 150,000 feet of floor space.

A full manufacturing and engineering staff will be maintained and closer co-operation given to western customers. Shipping raw materials east and the finished product west, adds a god deal to the ultimate cost because of freight charge. The situations at Corliss, will make a substantial reduction in these additional transportation costs.

Shipping facilities are ample as Corliss is on the main line of the C. M. & St. P. R. R. and is the junction through which trains pass almost every hour between Chicago and Milwaukee; it is also the only express stop on this eighty-five mile run.

Racine also with her lake ports is only six miles east. Connection may be easily made with all the principal lines east and west thereby making Corliss ideal from a shipping standpoint.

The new plant will be under the same direction as the other factories at Hyde Park, Galt, San Francisco and Philadelphia with Ex-Governor Foss as President.

Mr. Harry W. Page has been selected as general manager and will be in entire charge of the Wisconsin plant.

Mr. Page is a graduate of Baraboo High School and also of the University of Wisconsin. For the past six years, he was assistant general manager and was located at the main office of the B. F. Sturtevant Co., at Hyde Park, Boston, Mass.

National Container Association Organized

Of great importance to the manufacturers and users of corrugated and solid fibre containers was the formation of a new association on May 22nd and 23rd, at the Drake Hotel, Chicago, to be known as the National Container Association. Heretofore there have been two associations in the fibre container industry, The Container Club and The National Association of Corrugated & Fibre Box Manufacturers. The new association will comprise the membership of these organizations and other manufacturers who have not been identified with association work. It is expected that the National Container Association will start with a membership of from seventy-five to eighty manufacturers of corrugated and solid fibre containers, representing in the neighborhood of eighty per cent of the total production in the United States of these containers.

The officers of the new association, elected at the meeting referred to, are: president, F. J. Kress, F. J. Kress Box Company, Pittsburgh, Pa.; vice-president, John L. Barchard, Hummel & Downing Company, Milwaukee, Wis.; general manager, George R. Browder, of Chicago; secretary-treasurer, B. C. Tamlin, of Chicago. The affairs of the association will be directed by an executive committee, the members of which are F. J. Kress, John L. Barchard, J. P. Brunt, James B. Fenton, George Gair, C. W. Gaylord, W. S. Goodwillie, Irving Hill and Samuel Samuels.

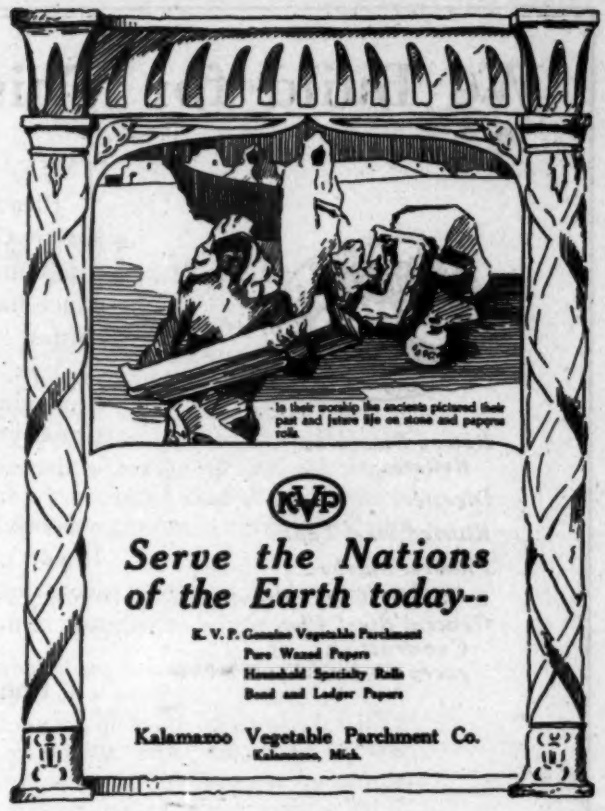
All of the activities of the two associations will be continued, which will include research work with a scientific laboratory at the Mellon Institute, Pittsburgh, and a testing and designing laboratory in Chicago, statistical service, inspection, traffic and classification matters, etc.

The executive office of the new association will be maintained in the Transportation Building, 608 South Dearborn Street, Chicago.

The Watervliet Paper Co., Watervliet, Mich., plan to make numerous improvements in its plant in the near future. These include the installation of electrical and other equipment.

The Northwestern Pulp and Paper Co., of Petoskey, Mich., is considering the rebuilding of its pulp mill which, on May 7, was partially destroyed by fire.

On May 6, fire destroyed a portion of the plant of the Fort Miller Pulp and Paper Co., Fort Miller, N. Y. The loss was estimated at $100,000. It is planned to rebuild.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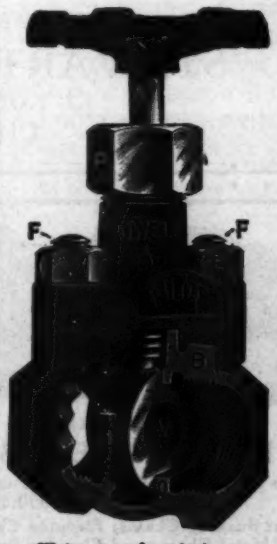

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